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Final Exam: Fall 1997

This exam is worth 30% and you have 2 hours.

1. You have been asked to value Sonata Inc., a manufacturer of musical keyboards for computers. The company has estimated its free cash flows to equity and its cost of equity for the next 4 years:

Year	1	2	3	4
EPS	\$ 1.50	\$ 1.80	\$2.16	\$2.59
FCFE/sh	- \$ 2.00	- \$ 1.20	\$ 0.34	\$ 0.09

The earnings per share are expected to grow 6% a year after year 4, and net capital expenditures are expected to decline 50% after year 4. Sonata currently has a beta of 1.5 and no debt or working capital needs, but expects its beta to drop to 1 after year 4. The debt ratio will remain at 0%. The T.Bond rate is 7%.

- Estimate the terminal value of equity per share. (3 points)
- Estimate the value per share today. (3 points)

2. Corox Inc. is a chemical manufacturing company which reported earnings before interest and taxes of \$ 150 million this year. The firm has a cost of capital of 10%, a tax rate of 40% and expects earnings to grow 5% a year in perpetuity. You know that the firm has no working capital requirements but does have net capital expenditures that it needs to make to grow. The firm has return on capital of 12.5% that it expects to maintain in perpetuity.

- Estimate the net capital expenditures for Corox, given the expected growth rate and return on capital. (4 points)
- Estimate the value of the firm. (1 point)

3. You are involved in the valuing Cephalon Inc., an auto parts manufacturing firm with promising technology but poor management, for a hostile acquisition. The firm currently has revenues of \$ 1 billion, a pre-tax operating margin of 5%, a tax rate of 40% and an expected growth rate in earnings of 5%. The firm also has a debt to capital ratio of 10%, a beta of 0.8 and a cost of borrowing of 7.5%. The firm has no net capital expenditure or working capital needs. The T.Bond rate is 7%.

- Estimate the Value/Sales Ratio for Cephalon Inc. (2 points)

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b. You believe that if the current management is replaced, you can increase the pre-tax operating margin to 7%, and that you will increase the debt to capital ratio to 30%. The cost of borrowing will increase to 8%. If the expected growth rate remains 5%, estimate the Value/Sales Ratio for Cephalon with these changes. (4 points)

4a. You have used the Black-Scholes option pricing model to value the equity in a firm with negative earnings and substantial leverage - bonds with an average duration of 5 years. Inputting the numbers for the model, you have arrived at the following values for d_1 and d_2 .

$$d_1 = 0.39 \qquad d_2 = 0.17$$

Using the normal distribution table supplied, estimate the probability that the firm will go bankrupt during the next 5 years. (2 points)

4b. Assume now that you have valued the equity (using the option pricing model) at \$ 9 million, and that the value of the firm is \$ 75 million, estimate the appropriate interest rate that you should be paying on your debt. (The riskless rate is 7%) (4 points)

5. You have been asked to value the synergy in a merger by your boss who also happens to be an avid believer in EVA. You are given the following information on the two firms:

- G & P is a diversified consumer product company with \$ 2 billion in capital invested, a return on capital of 13% and a cost of capital of 11%. The firm is assumed to be in stable growth and the EVA is expected to grow 5% a year in perpetuity.
- BandAdd is a smaller company that produces only perfumes. It has \$ 500 million in capital invested, earning a return on capital of 16% with a cost of capital of 12%. This firm is also in stable growth and the EVA is expected to grow 5% a year in perpetuity.

- Both firms have 40% tax rates.

a. Value G & P using the EVA approach. (2 points)

b. Value BandAdd using the EVA approach. (2 points)

c. As a result of the merger, you expect the firm to be able to lower its cost of capital to 10% (as a result on increased debt capacity) and to post an increase in the combined operating income of 10% (as a result of economies of scale). Estimate the value of synergy in this merger. (3 points)

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Final: Equity Instruments and Markets: Spring 1998

Answer all questions and show necessary work. Please be brief. This is an open books, open notes exam.

1. You have been asked to do a discounted cash flow valuation of a firm and have been given the following partial inputs to the valuation.

<i>Year</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
Growth rate	20%	20%	20%	5%
EBIT (1-t)	100	120	144	151.2
Cost of Equity	15.00%	14.50%	14.00%	12.50%
Cost of Debt	7%	7%	7%	7%
Debt Ratio	10%	20%	30%	40%
Return on Capital	25%	25%	25%	15%

The firm has a tax rate of 40%. Estimate the value of the firm today. (5 points)

2. You have been asked to analyze the synergy in a merger of two small mid-western banks, and have been provided the following information on both banks.

	<i>BancFirst</i>	<i>Farmers Bank</i>
Net Income	144	250
Book Value of Equity	1200	2500
Beta	1.00	1.00

Both firms are in stable growth and are growing 6% a year. The merger is motivated entirely by cost savings. The treasury bond rate is 6%. Both banks have tax rates of 40%.

- Estimate the value of BancFirst. (2 points)
- Estimate the value of Farmers Bank. (2 points)
- If the combined bank will save \$ 50 million a year in operating expenses starting right away, estimate the value of synergy. (2 points)
- If the savings will not begin until four years from now, estimate the value of the synergy. (1 point)

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3. Now you are asked to analyze the value of control in IntelliGroup, a poorly managed conglomerate. IntelliGroup currently has no debt outstanding, a beta of 0.80, and earns \$ 250 million in earnings before interest and taxes on a book value of capital of \$ 1500 million. You believe that the firm can optimally have a 30% debt to capital ratio, and that it can borrow the money to get to this ratio at 7.5%. In addition, you believe that the firm can earn a 5% higher return on capital than it earns currently on both existing assets and future projects. The firm is in stable growth, growing 5% a year, and restructuring the firm cannot alter that growth rate. The firm has a tax rate of 40% and the treasury bond rate is 6%.

- a. Estimate the value of changing the management at this firm. (5 points)
- b. Now assume that the probability of changing the management is only 50%, and that the market is both efficient and agrees with your assessments of the numbers. What would you expect the market value of equity to be today? (1 point)

4. You have been offered a stake in the equity of PhoneTec, a heavily levered cellular phone company and the current income statement is as follows:

Revenues	12500
- Operating Expenses	11000
- Depreciation	2000
EBIT	-500
- Interest Expenses	1000
Taxable Income	-1500
- Taxes	0
Net Income	-1500

The firm has a negative book value of equity and negative net income. The firm's average interest rate on the debt on its books is 10% (This is the interest expense divided by the face value of the debt, which is entirely in the form of 10-year corporate bonds). The bonds are trading at a 15% discount on face value, and have a duration of 6.5 years. The average Value/EBITDA multiple for other cellular firms is 10. The treasury bond rate is 6% (You can assume that this applies to all maturities over 5 years)

- a. Estimate the value of equity in the firm, based upon the valuation of comparable firms. (2 points)
- b. Now assume that you the monthly variance in $\ln(\text{stock prices})$ at PhoneTec to be 0.05

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and the monthly variance in $\ln(\text{bond prices})$ to be 0.01; the correlation between the two is 0.25, and the average debt to capital ratio during the period of the analysis was 80%. If you wanted to value the equity in PhoneTec as an option, what would the inputs to a Black Scholes model be? (3 points)

S =

K =

r =

t =

$\sigma^2 =$

c. Now assume that I have inputted the numbers into a Black Scholes model and come back with the following output.

d1 = 0.5606

d2 = -0.3310

Using the normal distribution table provided in the back estimate of the probability that this firm will go bankrupt sometime of the next 10 years. (1 point)

d. Using the inputs from the previous page, and the values of d1 and d2 that are provided on this page, estimate the value of equity in this firm. (If you are using inputs different from mine, the values of d1 and d2 will be different, but do not worry about it.) (1 point)

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VALUES OF $N(d)$ FOR SELECTED VALUES OF d

	N	d	$N(d)$
		0.1	8412
		0.2	8531
		0.3	8649
		0.4	8749
		0.5	
		0.6	
		0.7	
		0.8	
		0.9	
		1.0	
		1.1	
		1.2	
		1.3	
		1.4	
		1.5	
		1.6	
		1.7	
		1.8	
		1.9	
		2.0	
		2.1	
		2.2	
		2.3	
		2.4	
		2.5	
		2.6	
		2.7	
		2.8	
		2.9	
		3.0	
		3.1	
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		5.0	
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Fall 1998: Final Exam: Equity Instruments and Markets

Answer all questions and show necessary work. Please be brief. This is an open books, open notes exam.

1. Cementics is a large manufacturing firm that reported earnings before interest and taxes of - \$ 400 million (i.e., a loss of \$ 400 million) on revenues of \$ 8 billion in the current year. The firm expects its pre-tax operating margin to improve next year to the industry average of 5%. The average cost of capital for the industry is 10%, the average return on capital for the industry is 12.5% and the industry is mature, with all firms in it expecting to report growth of 5% in revenues over the long term. The marginal tax rate for all firms is 40%.

a. Estimate the value of Cementics as a firm. (You can assume that it will have the same cost of capital and return on capital as the rest of the industry) (3 points)

b. Now assume that Cementics will have \$ 861 million in net operating losses to carry forward after the current year. How will this affect the firm valuation that you did in part (a)? (2 points)

2. Seville Enterprises is a diversified conglomerate with holdings in multiple businesses. You have been asked to estimate the appropriate value to assign to the equity in the firm. The following table summarizes the firm's holdings in different businesses:

<i>Business</i>	<i>Net Income</i>	<i>Book Value of Equity</i>	<i>Sector Reg</i>
Steel	\$ 150 million	\$ 1500 million	PBV = $0.8 + 1.5$ (ROE)
Financial Services	\$ 300 million	\$ 2000 million	PBV = $1.3 + 1.0$ (ROE)
Technology	\$ 100 million	\$ 500 million	PBV = $3.5 + 2.5$ (ROE)
Retailing	\$ 200 million	\$ 1000 million	PBV = $1.75 + 1.8$ (ROE)

(The ROE is entered in decimals. Thus, a steel firm with a ROE of 5% would have a PBV ratio of $0.8 + 1.5(.05) = 0.875$)

There are 400 million shares outstanding.

a. Estimate the value of the equity in Seville Enterprises. (3 points)

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b. Now assume that the firm sells its technology division to another firm for \$ 2.5 billion. What would you expect to happen to the value per share of equity in Seville Enterprises?

(2 points)

3. You have been asked to check the valuation of InfoSys, a software firm, done by an eminent analyst. You note that the analyst has assumed earnings growth of 10% a year for the next 3 years, and 5% a year thereafter, and has arrived at a value for the firm of \$ 400 million. While you find yourself in agreement with most of the assumptions made by the analyst, you disagree with the assumption she has made that capital expenditures will offset depreciation after year 3. You believe, instead, that capital expenditures will be 150% of depreciation after year 3. If the current depreciation is \$10 million and the cost of capital is 11%, estimate the effect of this change in assumption on the value of the firm. (There are no working capital requirements and depreciation grows at the same rate as earnings) (5 points)

4. Merck has asked you to assess the value of a patent on a drug for treating Parkinson's disease that they would like to acquire from Genzyme, a small biotechnology firm. The patent was obtained 3 years ago, and had a 17-year life when it was granted. The drug has been approved by the FDA, and the current assessment is that it would cost \$ 1 billion to develop it for commercial production. Based on the potential market and competition, it is believed that the after-tax cash flows on the drug would be \$ 100 million, growing at 5% a year until the patent expires. In addition, you are provided with all of the following information (some of which might be redundant or useless). You can also assume that this is the only product that Genzyme has as a firm.

Merck		Genzyme
The treasury bond rate is 5%. Estimate the inputs to value this patent as an option. (5 points)		
Cost of equity	12%	15%
After-tax Cost of debt	4%	4%
Debt/Capital Ratio	10%	10%
Std Dev in firm value	25%	50%

$$t = \sigma^2$$

$$= y$$

=

5. Assume now that Merrill Lynch announces that it plans to acquire Charles Schwab in a cash transaction. The stock prices of the two firms had the following reaction to the

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announcement:

	Merrill Lynch	Charles Schwab
Stock Price before	\$ 65	\$ 40
Stock Price after	\$ 63	\$ 45

Merrill Lynch has 330 shares outstanding, while Charles Schwab has 260 shares outstanding.

a. Estimate the market's assessment of the value of synergy in this transaction on the announcement day. (3 points)

b. Now assume that the acquisition was motivated by potential cost savings from consolidating operations. If the cost of capital for both firms is 10%, and the expected growth rate in the cost savings in perpetuity is 3%, estimate how much the costs savings would have to be next year to justify the synergy assessment in part (a). (2 points)

6. You have been asked to assess the economic value added by Stereo Depot, an electronics retail store, in the last financial year. You note that the after-tax operating income for the year was \$ 50 million, the net income was \$ 25 million and the firm paid no dividends. In addition, you note that the book value of equity at the end of the year is \$ 300 million and the book value of the debt at the end of the year is also \$ 250 million. Finally, you are also told that the firm issued no stock during the year and had a net debt issue (New debt issued – Debt repayments) of \$ 50 million. The firm has a market value for equity of \$ 800 million and debt with an estimated market value of \$ 200 million. The riskfree rate is 5%, the beta for the stock is 1.00 and the firm has a pre-tax cost of borrowing of 6%. (The firm has a tax rate of 40%). Estimate the economic value added last year. (5 points)

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Spring 1999 : Final Exam

Answer all questions and show necessary work. Please be brief. This is an open books, open notes exam.

1. You are trying to estimate the value of synergy in a merger. The two firms involved, Novotel and VideoGraf, have the following characteristics:

	Novotel	VideoGraf
EBIT	\$ 160 million	\$ 450 million
BV of Capital (Beginning)	\$ 1,000 million	\$ 2,400 million
Beta	0.8	0.8
Debt to Capital Ratio	10%	10%
Cost of debt (pre-tax)	8%	8%

Neither firm has any working capital requirements, and they are both in stable growth, growing at 5% a year in perpetuity. The tax rate for both firms is 40%, and the treasury bond rate is 5% (The market risk premium is 6.3%)

- a. Estimate the value of the combined firm, assuming no synergy. (3 points)
- b. Now assume that when the merger occurs, the combined firm will be able to reduce its capital base (book value) by 20%, while leaving operating income intact. In addition, it plans to tap into the extra debt capacity that it will have to raise its debt to capital ratio to 25%, while keeping its cost of debt unchanged. Estimate the value of synergy in this merger. (You can assume that the firm will still be in stable growth at 5%).(4 points)

2. You have been asked to assess the valuation of a chain of privately owned video stores for sale to Blockbuster, a publicly traded firm. The analyst, who valued the video stores at \$ 65 million, valued the firm using the following parameters:

- The cost of equity used was 25% to reflect the high risk of a private business, the after-tax cost of debt was 5%, and the book value debt to capital ratio of 50% was used to compute the cost of capital

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- After the valuation of the firm was done, the analyst reduced the value by 35% to reflect the illiquidity discount

While you agree with the analyst's estimate of after-tax cash flows for this firm, and her assumption that the firm is in stable growth, growing 5% in perpetuity, you disagree on other counts. In particular, you note that the average beta of other firms in this kind of service business is 1.1, and that the average market value debt to capital ratio of other firms in this business is 10%. You believe that this private firm will have a similar debt ratio after the sale to Blockbuster. Estimate the correct value of this firm for sale to Blockbuster. (You can still assume a riskfree rate of 5%, and a risk premium of 6.3%)

(6 points)

3. You are scanning a list of stocks in the specialty retail sector for bargains. The PE ratios, expected growth rates in earnings, risk levels and payout ratios (including both dividends and stock buybacks) are listed below: (2 points each)

<i>Firm</i>	<i>Current PE</i>	<i>Exp. Growth</i>	<i>Beta</i>	<i>Payout</i>
Gap	45	30%	High	10%
Limited	15	10%	Low	40%
Abercombie	45	10%	High	10%
Ann Taylor	45	10%	Low	10%
Talbots	15	30%	Low	40%
Gymboree	15	30%	High	40%

a. Which of these firms is most likely to be under valued? (Choose only one firm)

b. Which of these firms is most likely to be over valued? (Choose only one firm)

Under valued: A firm trading at a PE much lower than it should be trading for

Over valued: A firm trading at a PE much higher than it should be trading for

4. Retinall Inc. is a manufacturing firm that has had significant operating problems in recent years. In 1998 (most recent financial year), the firm was trading at half its book value of \$ 2 billion, while posting a return on equity of 8%. Assuming that the stock is correctly priced now, and that Retinall is in stable growth, growing 4% a year, estimate

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the effect on the price to book value ratio of a doubling of the return on equity. (You can assume that the growth will not change as the return on equity changes) (6 points)

5. BioSpecs Inc. is a small bio-technology firm that has patents on three products, two of which have already been developed for commercial use and one undeveloped product on which it has a patent for the next 15 years. The firm has a total market value of \$ 500 million, and the licensing fees on its developed products are expected to be \$ 30 million a year for the next 10 years. (The cost of capital for the firm is 12%.) You have also been told that a recent commercial analysis of the patented product (which has not been developed yet) yielded a net present value of –\$150 million (negative) and that it is estimated that there is a 60-75% chance that the product will eventually be commercially viable. The riskfree rate is 10%. Estimate the present value of the expected cash flows from developing the drug today. (7 points)

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Equity Instruments : Final Exam- Fall 1999

Answer all questions and show necessary work. Please be brief. This is an open books, open notes exam.

1. Revex operates a chain of pharmacies around the country. You have been provided with the following projections for the firm (in millions of dollars)

	<i>1</i>	<i>2</i>	<i>3</i>	<i>4 (Terminal year)</i>
EBIT	\$ 100.00	\$ 125.00	\$ 156.25	\$ 164.06
Net Cap Ex	30	37.5	46.5	32
Total Working Capital	60	70	82	88
Cost of Equity	12%	11%	11%	10%
Pre-tax Cost of borrowing	8.00%	7.50%	7%	7%
Debt to Capital Ratio	25%	25%	25%	25%

The firm has a marginal tax rate of 40%, but it has net operating losses of \$ 175 million that it is carrying forward. The firm will grow at 5% forever, starting in year 4. The working capital currently is \$ 52 million.

- Estimate the expected cash flows to the firm for the next 3 years. (2 points)
- Estimate the cost of capital each year for the next 3 years. (2 points)
- Estimate the terminal value at the end of year 3. (1 point)
- Estimate the value of the firm today. (2 points)

2. American Health Care, a pharmaceutical firm, announces that it will be acquiring Healthcare Associates, a hospital management firm. The following table summarizes the expected cash flows to the firm at each of these firms, run independently, and the expected cash flows from the combined firm with synergy benefits.

	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
AHP	\$100	\$120	\$144	\$173

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HA	\$60	\$69	\$79	\$91
Combined firm (with synergy)	\$172	\$203	\$239	\$282

The cost of capital for both firms, run independently, is 10%; the combined firm will have the same cost of capital. The expected growth rate in the cash flows after year 4 is 5%, for the firms run independently, and for the combined firm.

- a. Estimate the value of synergy in this merger. (3 points)
- b. Assume that Healthcare Associates was fairly valued before the acquisition. American Health Products had 100 million shares outstanding at \$ 47.46 per share, before the acquisition. If American Health Products paid a premium (over the market price) of \$ 500 million for Healthcare Associates, what would you expect will happen to American Health Product's stock price on the announcement? (2 points)

3. You are looking over a valuation of a Sysoft, a small software company, that has had its equity valued at \$ 2 billion by an investment bank. You notice that the analysis has applied the average price earnings ratio of the software industry to the net income of Sysoft, which is \$ 100 million, to estimate this value. You also note that Sysoft's earnings are expected to grow at 15% a year, while the industry's earnings are expected to grow at 10% a year. Based upon its higher expected growth rate, you believe that Sysoft should have a PEG ratio that is 1.25 times the average PEG ratio for the software industry. Based upon this estimate what would should the value of Sysoft to be?

(5 points)

4. Lukens Oil is an intergrated oil company that has significant developed and undeveloped reserves. The company has 500 million shares oustanding, trading at \$ 20 per share, and has debt outstanding of \$ 5 billion. Lukens is expected to generate \$ 1000 million in cash flows each year for the next 5 years from its developed reserves. The cost of capital for the firm is 9%.

- a. Estimate the value of the undeveloped reserves. (3 points)
- b. What effect will the following actions have on the undeveloped reserves? (4 points)

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1. Technological advances allow you to drill deeper and extract oil cheaper than you used to be able to. Increase Decrease Effect uncertain

2. The price of oil increases, due an OPEC agreement, but the expected future variability in the price decreases, because of price fixing.

 Increase Decrease Effect uncertain

3. Interest rates increase.

 Increase Decrease Effect uncertain

4. The government reduces the period during which the oil firm can develop these reserves. Increase Decrease Effect uncertain

5. Sunmask is a cosmetics firm that has seen its stock price fall, and its earnings decline in the last year. You have been hired as the new CEO of the company and a careful analysis of Sunmask's current financials reveals the following:

- The firm currently has after-tax operating earnings of \$ 300 million on revenues of \$ 10 billion, and a capital turnover ratio (sales/book value of capital) of 2.5.
- The firm is expected to reinvest 60% of its after-tax operating income
- The firm is all equity financed and has a cost of capital of 10%

a. Estimate the value of the firm, assuming existing policies continue forever. (Returns on capital and reinvestment rates remain constant forever, as well) (2 points)

b. Assume that you can increase after-tax operating margins from 3 to 5% without affecting the capital turnover ratio, that you can lower the reinvestment rate to 40%, and that the cost of capital will become 9%, if you shift to your optimal debt ratio. How much would your firm value increase if you were able to make these changes? (4 points)

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Equity: Spring 2000 – Final Exam

Answer all questions and show necessary work. Please be brief. This is an open books, open notes exam.

1. You have been asked to value Wythe Pharmaceuticals and have been supplied with the following information:

- The firm reported earnings before interest and taxes of \$ 1 billion on revenues of \$ 15 billion last year.
 - These earnings were after research and development expenses of \$ 1 billion last year. You have capitalized research expenses, using a 5-year amortizable life, and estimated a value for the research asset of \$ 3 billion, and amortization of \$ 600 million on this asset for last year.
 - Last year, the firm had capital expenditures of \$ 800 million and depreciation of \$ 500 million. There are no working capital requirements.
 - The book value of equity at the beginning of the year was \$ 5 billion and the book value of the debt was \$ 1 billion. The firm has operating lease commitments of \$ 1 billion each year for the next 5 years.
 - The beta for the stock is 1.2. The pre-tax cost of debt is 7%, the riskfree rate is 6% and the market risk premium is 4%. The current market value debt ratio is 20%.
 - The tax rate for the firm is 40%
- a. Estimate the firm's after-tax operating income, adjusted for both R&D expenses and operating leases. (2 points)
- b. Estimate the book value of capital at this firm, adjusted for R&D expenses and operating leases. (2 points)
- c. Estimate the reinvestment rate at this firm, adjusted for R&D expenses and operating leases. (1 point)
- d. Estimate the economic value added by this firm last year, using the operating income and book value of capital, adjusted for R&D expenses and operating leases(2 points)

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2. You are trying to estimate the brand name value of Zycon Perfume and have collected the following information on Zycon and a generic perfume manufacturer, Cheap Perfume Inc.

	Zycon	Cheap Perfume
After-tax Operating Margin	20%	8%
Sales/Capital Ratio	2.5	3
Cost of capital	10%	10%

Both firms are in stable growth, growing at 5% a year in perpetuity.

- Estimate the value to sales ratio for Zycon. (2.5 points)
- Estimate the value to sales ratio for Cheap Perfume. (2.5 points)
- If both firms have the same book capital invested (\$ 5 billion), estimate the value of Zycon's brand name. (2 points)

3. You are trying to estimate the value of a small pharmaceutical firm with one existing product and one new patent. The existing product is generating after-tax cash flows of \$ 120 million a year, and is expected to continue to do so for the next 8 years. The new patent is on a drug to treat Lyme Disease and has already been approved by the FDA. Based upon an analysis of the market currently, you anticipate that this drug, if approved, could generate \$ 250 million in after-tax cash flows a year until the patent expires in 16 years. The firm will have to invest \$ 2.5 billion today to generate these cash flows. The firm has a cost of capital of 11% and the riskfree rate is 6%.

- Estimate the value of the existing product to the firm. (1 point)
- Estimate the net present value of producing the new product (on which the firm has a patent) today. (2 points)
- Estimate the value of the patent as an option. (A simulation of the project cash flows yielded a variance of 0.10 in the present value of the cash flows) [You can use the nearest point you can find in the normal distribution for N(d)] (4 points)

4. You have been asked to assess the value of synergy in a merger of TriMedia Productions, a firm that produces movies, with Leppard Records, a record company. The

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following table summarizes the current debt ratios and other relevant statistics for the two firms:

	TriMedia	Leppard
Optimal Debt Ratio	10%	10%
Current Beta	0.9	1.1
Current cost of debt	7%	7%
Market Value of Equity	\$ 900 million	\$1800 million

Both firms are at their optimal debt ratios prior to the merger and are fairly valued; they are in stable growth and expect to grow 5% a year forever. After the merger, however, it is anticipated that the optimal debt ratio for the combined firm will be 30%, and that the cost of debt for the combined firm at this debt ratio will be 7.5%. The current riskfree rate is 6% and the market risk premium is 4%, estimate the value of synergy in this merger. (The tax rate for both firms is 40%) (8 points)

Name:

Equity Instruments : Final Exam – Fall 2001

Answer all questions and show necessary work. Please be brief. This is an open books, open notes exam.

1. Satellite Telecommunications Inc. is a firm in significant financial trouble. The firm reported an EBITDA of - \$ 100 million last year on revenues of \$ 1000 million. You expect revenues to grow 30% a year for the next 3 years and the EBITDA as a percent of revenues to be -5% in year 1, 5% in year 2 and 25% after that. The firm has substantially over invested in plant and equipment in the last few years and will reduce its capital expenditures to \$ 50 million a year for the next 3 years, while depreciation will remain at \$ 100 million a year for the next 3 years. Non-cash working capital is expected to be 5% of revenues. After year 3, the firm will grow 4% a year forever, and maintain a return on capital of 10%. The cost of capital will be 12% for the next 3 years and 10% thereafter. The firm has a net operating loss carryforward of \$ 150 million currently and the marginal tax rate is 40%.

- a. Estimate the free cashflows to the firm for the next 3 years. (3 points)
- b. Estimate the terminal value at the end of year 3. (2 points)
- c. Estimate the value of the firm today. (2 points)

2. You are trying to value Hogwarts, a privately owned toy company. The firm reported net income of \$ 50 million on revenues of \$ 1 billion, and expected net income to grow 20% a year for the next 5 years. The unlevered beta of toy companies is 0.90 and Hogwarts has no debt; the correlation of publicly traded toy companies with the market is 40%. You have run a regression of toy companies against fundamentals and have come up with the following:

$$PE = 7.5 + 52.5 (\text{Expected growth rate}) - 5.0 (\text{Beta})$$

- a. Estimate the market value of equity for Hogwarts for an initial public offering. (2 points)

Name:

b. Estimate the market value of equity of Howarts, assuming that you are selling the company to a private individual who is not diversified. (3 points)

3. You are trying to value synergy in a merger of Silverado Stores, a discount retail firm, and Zale Distributors, a jewelry retailer. The primary motivation for the merger is cost savings for the combined firm, and these savings are expected to amount to \$ 10 million (pre-tax) next year (the first year after the merger) and grow 5% a year in perpetuity. Silverado has a beta of 1.20, market value of equity of \$ 100 million and a market value of debt of \$ 80 million. Zale has a beta of 1.30, a market value of equity of \$ 150 million and a market value of debt of \$ 50 million. Both firms have a pre-tax cost of debt of 7% and the tax rate is 30%; the firms plan no new debt issues after the merger. The riskfree rate is 5% and the market risk premium is 4%.

a. Estimate the cost of capital for the combined firm (4 points)

b. Estimate the value of the synergy (2 points)

4. Uvian Inc. is a chemical firm that reported earnings before interest and taxes of \$ 50 million on revenues of \$ 1 billion in the most recent year. The book value of capital invested in the firm is \$ 500 million and the firm faces a tax rate of 50%. The firm is unlevered and has a cost of equity of 8%. (The riskfree rate is 5% and the market risk premium is 4%.)

a. If the firm is in stable growth, expecting to grow 3% a year in perpetuity, and its current fundamentals are expected to remain unchanged forever, estimate the value of the firm. (2 points)

b. Now assume that you can double the firm's pre-tax operating income, lower the tax rate to 40% and increase its debt to capital ratio to 20%. If the pre-tax cost of borrowing is 6%, estimate the value of the firm after the restructuring. (4 points)

5. Grauer Pharmaceuticals is a small bio-technology firm with one commercially developed product and one patent.

- Its commercially developed product generated after-tax cashflows of \$ 10 million last year, and these cashflows are expected to grow 10% a year for the next 5 years, until the patent expires; the product will be discontinued soon after.

Name:

- Its patent is promising but has just successfully gone through the FDA approval process. The cost of developing the drug is \$ 150 million and the firm has 15 years of patent life left on the drug. The drug, if developed today, is expected to generate after-tax cashflows of \$ 12 million a year for the next 15 years.
 - The standard deviation in firm value of publicly traded biotechnology firms is 40% and the average unlevered beta of publicly traded biotechnology firms is 1.4. Grauer Pharmaceuticals has no debt. The riskfree rate is 5% and the risk premium is 4%.
- a. Estimate the value of the commercially developed product. (2 points)
- b. Estimate the value of the patent. (4 points)

S =

K =

T =

Riskless rate =

Standard deviation =

Cost of delay =

Equity Instruments : Final Exam

Answer all questions and show necessary work. Please be brief. This is an open books, open notes exam.

1. You are reviewing the valuation of Holden Hotels done by another analyst. The analyst assigned a value of \$ 3 billion to the firm, based upon the assumptions that the firm is stable growth, growing 5% a year, and that the cost of capital is 10%. In making the valuation, though, the analyst assumed that capital expenditures would offset depreciation and that there are no working capital needs. Digging deeper, you find that the book value of debt at Holden Hotels is \$ 500 million and the book value of equity is \$ 750 million. Assuming that the estimate of after-tax operating income for next year made by the analyst in his valuation is correct and that the firm will continue to earn the same return on capital in perpetuity, estimate the correct value for the firm. (5 points)

2. You have been asked to compare two banks – Suntrust Banks and Southwest Banks. Suntrust has a market value of equity of \$ 1.5 billion, a book value of equity of \$ 750 million and is expected to earn 20% as its return on equity. Southwest Banks has a market value of equity of \$ 1.00 billion and a book value of equity of \$ 750 million. Both firms are in stable growth, growing at 5% a year, and the same cost of equity.
 - a. Assuming that Suntrust is correctly valued by the market, estimate the cost of equity for the bank. (3 points)
 - b. Using the cost of equity estimated in part a, estimate the return on equity that Southwest Banks is expected to earn in the future. (You can assume that Southwest Banks is correctly priced as well.) (3 points)

3. You have been asked to assess the value of synergy in an acquisition of a Nuevos Fashion, a children's apparel firm, by Fitch and Spitzer, a general apparel firm. You are supplied with the following information on the two firms.

- Nuevos Fashion earned an after-tax operating margin of 8% on its revenues of \$ 1000 million last year, and its sales to capital ratio was 2. The cost of capital is 10%.
- Fitch and Spitzer earned an after-tax operating margin of 10% on its revenues of \$ 2250 million and its sales to capital ratio was 2.5. The dollar cost of capital is 10%.

You can assume that both firms would be in stable growth as independent companies, growing 5% a year.

- a. Value Nuevos Fashion as an independent firm. (1.5 points)
- b. Value Fitch and Spitzer as an independent firm. (1.5 points)
- c. Now assume that the primary motive behind the merger is Fitch and Spitzer's belief that they can run Nuevos more efficiently and increase its sales to capital ratio and margin to match their own. Assuming that the growth rate remains unchanged at 5%, estimate the value of control in this merger. (3 points)

4. You have been called in by LaPlace Instruments, a manufacturer of medical equipment, to provide some advice on value creation. The firm has a market value of \$ 525 million and you believe that it is fairly priced. The firm reported EBITDA of 150 million in the most recent financial year and paid 40% of its income as taxes. The firm also had capital expenditures of \$ 75 million, depreciation of \$ 25 million and no working capital needs during the year. The firm has an expected growth rate of 4%. You believe that the firm can double its return on capital on new investments, but cannot do much to improve its return on capital on existing investments. Estimate the value of the firm with this change, assuming that the stable growth rate remains 4%. (6 points)

5. Ulysses Steel is considering a major investment in a new plant with a capacity of 1 million tons. It is anticipated that the plant will cost \$ 1 billion to build and generate expected after-tax cashflows of \$ 100 million a year for 20 years. There is substantial uncertainty about these expected cash flows – the standard deviation in annual cash flows is 40% - and the cost of capital is 10%.

- a. What is the net present value of the investment? (1.5 points)

As CEO of the company, you are concerned about the risk and you are considering an alternative plan. You will invest in a smaller plant with a capacity of 500,000 tons, which will cost \$ 500 million to build and generate expected cashflows of \$ 50 million a year for 20 years. However, you will have the ability to double the capacity and the expected annual cashflows for the remaining project life anytime over the next 5 years by spending an extra \$ 500 million. You can assume that the cost of capital remains 10% and that the treasury bond rate is 6%.

b. Estimate the net present value of the smaller plant (with a capacity of 500,000 tons) (1.5 points)

c. Estimate the value of the option to expand anytime over the next 5 years. (2 points for inputs and 2 points for option value)

S =

K =

T =

Standard deviation =

Riskless rate =

Dividend yield (if any) =

Equity Instruments: Final Exam

Answer all questions and show necessary work. Please be brief. This is an open books, open notes exam.

1. UVA Inc. is a company that manufactures and retails eye wear. The firm reported \$ 50 million in after-tax operating income on revenues of \$ 500 million in the most recent year. The company has 50 million shares outstanding, trading at \$ 8 per share, and \$ 150 million in debt at a current market interest rate of 8%; the corporate tax rate is 40%. The firm also has a cash balance of \$ 50 million. The stock trades at 1.6 times the book value (of equity) and debt trades at book value (of debt). The unlevered beta for eyewear firms is 0.80; the riskfree rate is 5% and the market risk premium is 4%.
 - a. Estimate the cost of capital for UVA Inc. (2 points)
 - b. UVA had capital expenditures of \$ 80 million and depreciation of \$ 40 million in the most recent year. If UVA has no working capital investments and expects to maintain its existing reinvestment rate and return on capital for the next 3 years, estimate the expected annual growth rate for this period. (1 point)
 - c. Estimate the value of UVA at the end of the third year, assuming that its growth rate drops to 4% after year 3 and it maintains its existing return on capital and cost of capital. (2 points)
 - d. UVA has 10 million options outstanding. If you value each of the options at \$ 12, estimate the value of equity per share based upon your estimated cashflows (from parts b and c). (3 points)
2. You are comparing the valuations of two telecomm firms and have come up with the following information:
 - SoundTech Telecom reported EBITDA of \$ 500 million last year. The firm had 100 million shares outstanding trading at \$ 20 a share and \$ 2 billion in debt outstanding. The company expects earnings to grow 20% a year for the next 5 years.

- Zif Telecom reported EBITDA of \$ 400 million last year. The firm had 50 million shares trading at \$ 30 a share, \$ 2 billion in debt and \$ 500 million as a cash balance. The company has a 40% tax rate but you do not know the expected growth rate in earnings.

Running a regression of EV/EBITDA multiples across telecomm companies, you have arrived at the following results:

$EV/EBITDA = 7.5 - 2.40 (\text{Tax rate}) + 6.50 (\text{Expected earnings growth rate: next 5 years})$

(Use decimals for tax rates and growth; enter 25% as .25)

- a. If SoundTech is correctly valued, relative to the sector, estimate the tax rate that the company faces. (2 points)
- b. Is Zif Telecom is under valued by 10% relative to the sector, estimate the expected growth in earnings in the next 5 years? (2 points)

3. Vader Enterprises, a chemical company, has fallen on hard times. Its stock had dropped 50% to \$ 6 a share; there are 100 million shares outstanding. The firm also has \$1.4 billion (market value) in debt outstanding (with an interest rate of 12%) and reported earnings before interest and taxes of \$ 300 million last year; the book value of capital of the firm is \$4 billion. The firm currently has a beta of 1.80, the riskfree rate is 5% and the market risk premium is 4%; the tax rate is 40%. You have been hired as CEO and you believe that you can do two things:

- You will issue new equity and reduce the market debt to capital ratio to 40%. This will reduce the interest rate on debt to 8%.
- You will be able to raise the return on capital to the cost of capital that will prevail after you recapitalize the firm (and reduce the debt ratio). This improvement will be only on new investments. (Existing investments will continue to earn the current return on capital)
- a. Estimate the cost of capital after you make the change in your debt ratio. (2 points)

- b. The firm is in stable growth, growing 4% a year. Estimate the firm value after the recapitalization and the improvement in return on capital, assuming that the growth does not change. (3 points)

4. Cavuto Inc. is a private company, in the software business. The owner, who has her entire wealth invested in the business, has come to you for some advice on a proposed acquisition of Soros Inc, a private retail business, also owned by an undiversified individual. You have collected the following information on the two companies:

- Cavuto reported after-tax operating income of \$ 10 million last year on a book value of capital of \$ 50 million. The firm is in stable growth, growing 4% a year in perpetuity.
- Soros reported after-tax operating income of \$ 5 million last year on a book value of capital of \$ 40 million. The firm is in stable growth as well, growing 4% a year in perpetuity.

Both firms are entirely equity funded. You have collected the following information on publicly traded firms in the software and the retail businesses:

Business	Unlevered Beta	Correlation with the market
Software	1.20	30%
Retail	0.90	40%

The tax rate is 40%. The riskfree rate is 5% and the market risk premium is 4%.

- a. Estimate the value of Cavuto as a stand-alone firm. (1.5 points)
- b. Estimate the value of Soros Inc. as a stand alone firm. (1.5 points)
- c. Estimate the value of synergy in the acquisition. The combined firm's equity will have a correlation of 50% with the market and you can assume that there are no operating synergies in this merger. (3 points)

5. You are considering how much you should bid for a five-story office building in New York. The building generates after-tax rental revenue (net of operating costs) of \$ 5 million a year, expected to grow 2% a year in perpetuity. The appropriate discount rate, based upon the riskiness of real estate, is 8%. Due to a quirk in the building code, the building carries with it a right that will allow you to add 25 floors

anytime over the next 10 years¹. You anticipate that the cost of adding these floors will be \$ 125 million today. Given the state of the office rental market right now, you believe that if you added these floors now, you would generate \$ 6 million in additional after-tax rental revenues, expected to grow 2% a year in perpetuity. The standard deviation in rental revenues is 20% and it will take you one year to complete the construction. The ten-year treasury bond rate is 4%.

- d. Estimate what you would pay for this building if it did not have the right to add on additional floors. (2 points)
- e. Estimate the value of the right to add the 25 additional floors to the building. (2 points for inputs and 3 points for option valuation)

S =

K =

t =

Cost of delay (if any) =

¹ It is very difficult to get permission in New York to add to an existing building and you cannot do so without having the legal permission.

Equity Instruments : Final Exam

Answer all questions and show necessary work. Please be brief. This is an open books, open notes exam.

1. You are trying to value ListoFact, a data processing company. The company generated \$ 1 billion in revenues in the most recent financial year and expects revenues to grow 3% a year in perpetuity. It generated \$ 30 million in after-tax operating income in the most recent financial year and expects after-tax operating margin to double over the next 3 years (in equal annual increments). After year 3, the margin will stabilize at year 3 levels forever. The firm is expected to have depreciation of \$ 20 million and capital expenditures of \$15 million each year for the next 3 years and to earn a 10% return on capital in perpetuity after that. There are no working capital requirements. The cost of capital will be 12% for the next 3 years and 10% thereafter.
 - a. Estimate the free cashflows to the firm each year for the next 3 years. (2 points)
 - b. Estimate the value of the firm at the end of the third year (terminal value) (2 points)
 - c. Estimate the value of equity per share today, if the firm has \$ 150 million in debt outstanding, \$ 25 million as a cash balance and 10 million shares. (2 points)
2. You have been asked to assess what value you would attach to Springbok Enterprises, a manufacturer of sports equipment that is planning a public offering next year. You have collected information on publicly traded sports equipments companies and have regressed enterprise value/sales ratios against after-tax operating margins:

$$EV/Sales = 0.25 + 0.10 (\text{After-tax Operating Margin})$$

(For example, the EV/Sales with a 10% after-tax margin would be $0.25 + 0.10(10) = 1.25$)

Springbok Enterprises is expected to generate \$ 15 million in after-tax operating income on revenues of \$ 100 million next year.

- a. Given your regression and Springbok's estimated margin, estimate the value you would put on Springbok today. (2 points)
- b. You feel that this regression is understating Springbok's enterprise value, largely because it does not factor in revenue growth into the prediction. If you wanted to add a proxy for growth into the regression above, which of the following would you use? (1 point)
- i. Expected growth rate in book value of equity
 - ii. Expected growth rate in earnings per share
 - iii. Expected growth rate in revenues
 - iv. Expected growth rate in net income
 - v. Historical growth rate in net income
 - vi. Historical growth rate in revenues
 - vii. Whichever growth rate gives me the highest R-squared
- c. Assume that Springbok has the option of remaining a private business and raising equity from a private equity investor. The private equity investor is willing to invest \$ 40 million in the firm in exchange for a 33.33% share of the equity in the firm. What value is the private equity investor attaching to the firm, if Springbok has \$ 30 million in debt outstanding and no cash? (1 point)
- d. Assume now that the private equity investor invests \$ 40 million in exchange for a 33.33% share of the equity in the firm and that Springbok will go public in three years. If you assume that the firm's margins will remain unchanged, that revenues will go up by 10% a year over the next 3 years and that there will be \$ 50 million in debt outstanding at the end of year 3, estimate the annual return that will be earned by the private equity investor over the 3 years. (You can assume that the regression in part a will continue to hold) (2 points)

3. Vapono Cheese manufactures cheese and frozen pizzas and is publicly traded. The firm is in stable growth, with \$ 15 million in after-tax operating income in the most recent financial year growing 3% a year in perpetuity. There are 15 million shares outstanding, trading at \$ 5 a share and \$ 25 million in debt (book value as well as market value). There is no cash balance and the cost of capital for the firm is 9%.

a. Assuming that the market is correctly pricing the equity in this firm today, what return on capital is Vapono expected to make in perpetuity? (2 points)

b. Now assume that the optimal debt ratio for Vapono is 40% and that the cost of capital at that debt ratio is 8%. If Vapono can move to its optimal and raise the return on capital on new investments to 8%, estimate the value of equity per share in the firm. (Leave the stable growth rate unchanged at 3%) (2 points)

c. Assume now that there is only a 20% chance that the firm will be run optimally. Of the 15 million shares, 5 million are voting shares and 10 million are non-voting shares. Estimate the value of a voting share. (2 points)

4. You have been asked to assess the value of synergy in a merger between two firms and the information on each firm is provided below:

- Ludmilla Enterprises is a small chemical firm with an enterprise market value of \$ 1 billion, an after-tax return on capital of 12% and a cost of capital of 8%.
- Lybov Inc. is a multi-business company with an enterprise market value of \$1.5 billion, an after-tax return on capital of 10% and a cost of capital of 8%.

Both firms are in stable growth and are fairly priced before the acquisition, with after-tax operating income and cashflows growing at 4% a year. The tax rate for both firm is 40%.

- a. If Lybov acquires Ludmilla for \$ 1.25 billion, the tax laws will allow it to write up Ludmilla's assets from their existing book value to the acquisition value (of \$ 1.25 billion). If you assume that the assets will be depreciated straight line over the next 10 years to a salvage value of zero (both pre and post acquisition), estimate the present value of the additional tax benefits that will accrue from this acquisition. (4 points)

- b. If Lybov has \$ 250 million in debt and 100 million shares outstanding, estimate the value of equity per share in Lybov after this transaction. (2 points)

5. A telecommunications company has the exclusive rights to a technology for the next 10 years. If developed today, it would require an upfront investment of \$ 1.2 billion and will generate after-tax cashflows of \$ 120 million each year for the next 10 years and \$ 80 million a year for the following 10 years. Each year of waiting is expected to reduce the present value of the cashflows on the investment by \$ 40 million. The riskless rate is 4% and the cost of capital for the technology firm is 10%. Though you cannot do a simulation, you have estimated that the standard deviation in stock prices of the firm is 50%, the standard deviation in bond prices is 10% and that the average debt to capital ratio for the firm over the period of estimation was 40%, (The correlation between stocks and bond is 0.30).

- a. Estimate the net present value of developing the technology today.

(2 points)

- b. Viewed as an option, what value would you attach to the technology. (4 points)

(2 points for getting the inputs rights and 2 points for the right option value)

S =

K =

T =

R =

Standard deviation =

Cost of delay (Dividend yield) =

(if any)

Equity Instruments: Final Exam

Answer all questions and show necessary work. Please be brief. This is an open books, open notes exam.

1. You have been asked to review a discounted cashflow valuation done by another analyst of Lichen Inc., a small manufacturing company. The analyst's estimates of after-tax operating income and free cashflows to the firm for the next 4 years are provided below:

<i>Year</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
EBIT (1-t)	\$100.00	\$115.00	\$132.25	\$152.09
FCFF	\$25.00	\$28.75	\$33.06	\$38.02

- a. Given the growth rate projected by the analyst and the FCFF numbers, estimate the return on capital that the analyst is assuming for the firm over the next 4 years. (You can assume that the return on capital will remain unchanged for the next 4 years) (2 points)
 - b. Assuming that the return on capital remains unchanged (from current levels) in perpetuity, that the cost of capital is 12% and that the expected growth rate is 4% forever after year 4, estimate the value at the end of the fourth year. (2 points)
 - c. Estimate the value per share today if Lichen Inc. has \$ 150 million in debt, \$ 100 million as a cash balance and 50 million shares outstanding. (1 point)
2. MiniTel Inc. is a company that operates in two businesses – telecomm equipment and cable. You are attempting to do a relative valuation of the company and have collected the following information on the two businesses:
- MiniTel reported revenues of \$ 1 billion and an operating loss of \$ 80 million from the telecomm equipment business. Most other publicly traded companies in the business also reported operating losses, but the average EV/Sales Ratio for the sector is 1.20.
 - MiniTel reported revenues of \$ 1.5 billion and EBITDA of \$ 150 million from the cable business. The average EV/EBITDA multiple for other publicly traded cable firms is 8.

MiniTel has \$ 1 billion in debt outstanding and a cash balance of \$ 600 million.

a. If there are 100 million shares outstanding, estimate the value of equity per share.

(2 points)

b. Now assume that you are told that MiniTel has a 60% holding in a LiveTel, a smaller telecom equipment company. LiveTel had revenues of \$ 250 million, EBITDA of \$ 10 million, debt of \$ 100 million and a cash balance of \$ 150 million and these numbers are fully consolidated into MiniTel's financial statements. (The telecomm numbers and the balance sheet numbers on the last page come from these consolidated financial statements). Estimate the value of equity per share in MiniTel, with this additional information. (3 points)

3. Labtec Pharmaceuticals has 100 million shares trading at \$ 10.40 a share, no debt outstanding or cash holdings and reported after-tax operating income of \$ 180 million in the most recent financial year. The market is pricing the company as a stable growth firm, with an expected growth rate of 4% and a cost of capital of 10%. (The riskfree rate is 5% and the market risk premium is 4%; the tax rate is 40%)

a. Assuming that the market is pricing the company correctly, what return on capital is it assuming in perpetuity? (2 points)

b. You have been hired as a turn-around CEO of Labtec Pharmaceuticals. You believe that you can increase the debt to capital ratio to 20% (with an after-tax cost of debt of 4%). Estimate the cost of capital after the increased debt. (2 points)

c. You also believe that you can double the return on capital on both existing and new investments for the firm while maintaining your existing reinvestment rate for the next 3 years. After year 3, you will maintain the higher return on capital but your growth rate will drop back to 4%. Estimate the new firm value with the changes in your debt ratio and return on capital. (4 points)

4. Bandai Inc., the manufacturer of action toys (Power Rangers) is interested in acquiring Pac-Man Inc., a manufacturer of video games. You have collected the following information on the two firms:

- Bandai reported after-tax operating income of \$ 100 million on revenues of \$ 2 billion in the most recent financial year. Its return on capital is 12% and it expects to maintain a growth rate of 3% a year in perpetuity.
- Pac-Man Inc reported after-tax operating income of \$ 50 million on revenues of \$ 1.5 billion in the most recent year. Its return on capital is 10% and it expects to maintain a growth rate of 3% a year in perpetuity.

Both firms have a 9% cost of capital in perpetuity.

- a. Estimate the value of Bandai as a stand-alone company. (1.5 points)
- b. Estimate the value of Pac-Man as a stand-alone company. (1.5 points)
- c. If Bandai acquires Pac-Man, it believes that it can increase the combined firm's return on capital on existing investments to 12% and on new investments to 15% while holding the growth rate in perpetuity at 3%. Estimate the value of synergy in this merger.

(3 points)

5. You are a private equity investor who has been approached by a technology firm, interested in raising money. The firm has revenues of \$ 10 million and an estimated current value of \$ 20 million. You have been offered a 20% share of the firm, which you can sell back to the other investors in the firm any time over the next 2 years for \$ 2 million. You also have the right to buy an additional 20% of the firm any time over the next 2 years for \$6 million. The standard deviation in firm value is 50% and the 2-year riskless rate is 4.

- a. What is the value of the option to sell back the 20% to the other investors in the firm any time over the next 2 years for \$ 2 million? (3 points)
- b. What is the value of the option to acquire another 20% of the firm value any time over the next 2 years for \$ 6 million? (3 points)

Equity Instruments: Final Exam

Answer all questions and show necessary work. Please be brief. This is an open books, open notes exam.

1. You have been asked to review a discounted cash flow valuation of Holmstrom Inc, a furniture manufacturer. The firm generated \$ 150 million in earnings before interest and taxes last year and expects these earnings to grow 10% a year for the next 3 years. The firm is expected to generate a return on capital of 20% on new investments for the next 3 years and have a cost of capital of 12%; there is no efficiency growth. After year 3, the firm will be in stable growth, growing 4% a year in perpetuity, with a return on capital of 12% and a cost of capital of 10%. The corporate tax rate is 40%.
 - a. Estimate the free cash flows to the firm for the next 3 years. (2 points)
 - b. Estimate the terminal value of the firm at the end of the 3rd year. (2 points)
 - c. Now assume that this firm has \$150 million in debt, cash and marketable securities of \$ 100 million and 5 million management options outstanding with an estimated value of 50 million. If these are 20 million shares outstanding in the company, estimate the value per share. (2 points)
2. Katsunaka Bank is a bank holding company in Japan. The bank reported a book value of equity of 200 billion yen on which it is expected to generate a net income of 16 billion yen next year. The bank is in stable growth, growing 2% a year and has a cost of equity of 6%.
 - a. Estimate the intrinsic price to book equity ratio for this firm (2 points)
 - b. Now assume that you are told that the stock actually trades at 3 times the book value of equity, largely on the expectation that the firm's future projects will earn higher returns than its current investments. If the growth remains unchanged at 2% a year, estimate the market's expectation of return on equity on future investments. (2 points)
 - c. Assume that you are comparing the price to book ratios of Japanese banks and you notice that Katsunaka Bank trades at a much higher price to book ratio than the other banks. Which of the following would you consider the best explanation for why this might happen? (1 point)
 - i. Katsunaka has a lower return on equity than the typical bank in the sector.
 - ii. Katsunaka has a lower proportion of bad real estate loans in its portfolio than the typical bank
 - iii. Katsunaka's earnings have been far more volatile over the last 5 years than other banks
 - iv. Katsunaka has a smaller market capitalization than the typical bank in the sector.
 - v. None of the above.
 - vi. All of the above

- d. Katsunaka Bank announces a stock buyback where it will buy back 10% of its outstanding equity, using cash that it has on hand. What effect will this have on the price to book ratio? (1 point)
- It will have no effect on the price to book ratio
 - It will decrease the price to book ratio
 - It will increase the price to book ratio
 - Impossible to tell without more information
3. You are trying to assess whether it makes sense for Luminol Inc., a consumer product manufacturer to divest itself of some of its businesses. The firm has book capital of \$ 2 billion, on which it generated after-tax operating income of \$160 million in the most recent year. The firm is considering divesting itself of its appliance business, which accounted for about half the total book capital of the firm, while generating only 40% of the firm's overall after-tax operating income. The cost of capital for all parts of the firm is 10% and the expected growth rate in perpetuity is 4%. The firm has \$250 million in debt, \$ 100 million in cash and 100 million shares outstanding.
- Estimate the value of equity per share before the divestiture, (2 points)
 - Assume now that the firm divests itself of the small appliance business for book value and keeps the proceeds as cash. Estimate the value per share after the divestiture. (4 points)
4. You are trying to value synergy in a merger of a media and an entertainment company. You are provided with the following information on the two companies:
- Paris Media is a movie company that expects to generate \$ 50 million in after-tax operating income next year on revenues of \$ 1 billion. The company has no debt and it has 50 million shares trading at \$ 10 a share.
 - Avax Inc. is a software company that specializes in animation software. The firm expects to generate \$ 10 million in after-tax operating income next year on revenues of \$ 500 million. The company has no debt and 15 million shares trading at \$ 10 a share.
- Both firms are in stable growth, growing 4% a year and have a cost of equity of 9%. You can also assume that both firms are correctly priced currently.
- If the combined firm will be able to generate the same earnings (both next year and in perpetuity) but with half the reinvestment that is being made by the individual firms now, estimate the value of synergy in this transaction. (4 points)
 - Now assume that Paris Media pays \$250 million to acquire Avax Inc. Estimate the value of equity per share in Paris Media after the transaction (incorporating the synergy assumptions in part a) (2 points)
5. You are trying to determine the correct premium to pay in acquiring a brand name company in an emerging market, that you believe offers significant expansion potential.
- In a conventional discounted cash flow valuation, you have estimated that the expected after-tax cash flow to the firm (after taxes and reinvestment needs) to be

\$10 million next year, growing 3% a year in perpetuity. The cost of capital for the firm is 8%.

- Anytime over the next 5 years, the firm has the option to invest and additional \$250 million and double the size of its business (You can assume that the cash flows at the time will double if the reinvestment is made, while the growth rate and the cost of capital will remain unchanged).
- The standard deviation in value for brand name companies is 30%.

The riskless rate is 5%.

a. Estimate the value of the firm (using a conventional discounted cash flow valuation). (2 points)

b. Estimate the value of the option to expand. (2 points for inputs, 2 points for option value)

S =

K =

t =

\int =

r =

There is no cost to waiting.

Equity Instruments : Final Exam

Answer all questions and show necessary work. Please be brief. This is an open books, open notes exam.

1. Nostalgia Inc. is a small, privately owned firm that sells antique furnishings. In the most recent year, the firm generated \$ 1.5 million in after-tax operating income on revenues of \$ 10 million; the firm reported book value of equity of \$ 5 million and book value of debt of \$2.5 million at the beginning of the year. During the year, the firm invested \$ 1 million in a new warehouse for furniture and reported depreciation of \$400,000 in its income statement. The firm's only working capital item is its inventory, which increased by \$150,000 during the course of the year. You have been asked by the owner to appraise the value of the company for sale and collected the following information on publicly traded counterparts:

- Publicly traded furniture companies have an average levered beta of 1.15 and an average market debt to equity ratio of 25%. The pre-tax cost of borrowing, on average, at these firms is 7%. The marginal tax rate for both private and publicly traded firms is 40%. On average, the correlation between furniture firms and the market is 0.40.
- The treasury bond rate is 5% and the equity risk premium is 4%.
 - a. Estimate the free cash flow to the firm to Nostalgia in the most recent year. (2 points)
 - b. Assuming that the firm maintains its existing return on capital and reinvestment rate for the next 5 years, estimate the expected annual growth rate for that period. (2 points)
 - c. If you were valuing this company for a sale in a private transaction (to an undiversified individual), what cost of capital would you use for the firm? (You can assume that this firm operates at the industry average debt to equity ratio and shares the same cost of debt) (2 points)

2. Prudence Bank is a publicly traded financial service firm that reported \$ 200 million in net income for the most recent year. The firm reported a return on equity of 16% in the same period and the beta for the firm is 1.00. The riskfree rate is 5% and the equity risk premium is 4%.

- a. If Prudence Bank expects to maintain this year's return on equity and also expects to grow 12% a year for the next 3 years, estimate how much the bank can pay as dividends each year for the next 3 years. (2 points)
- b. If you expect the earnings growth rate to drop to 4% after year 3 and the return on equity to decline to 12%, estimate the terminal value of equity at the end of year 3. (2 points)

c. Prudence Bank has 100 million shares outstanding and 10 million options, with an average exercise price of \$ 25 per share. Using the treasury stock approach, estimate the value of equity per share today. (2 points)

3. You are looking at Celia Cements, a publicly traded cement company in Latin America. You have estimated the firm's price to book ratio at 1.80 and you believe that the company will generate 20% as its return on equity (in US dollar terms) forever. The firm is in stable growth and expects to grow 5% (in US \$) a year in perpetuity. The riskfree rate in US dollars is 5%, the equity risk premium for mature markets is 4% and the levered beta for the firm is 1.00.

a. Assuming that the current market value is correct, estimate the additional risk premium that is being charged because this company is an emerging market company. (2 points)

b. As an alternative, you run a regression of the price to book ratios of cement companies against their returns on equities and whether they are emerging market or developed market companies.

$P/BV = 0.90 + 0.06 \text{ Return on Equity} - 0.40 \text{ Emerging Market dummy}$

Where the ROE is entered as an absolute value (15% would be entered as 15) and the emerging market dummy is set to 1 for emerging market companies; 0 otherwise. Is the stock under or over valued relative to this sector regression? (1 point)

c. You have been hired as the new CEO for Celia Cements and you feel that while the ROE for the firm is admirable, it should be reinvesting more for the next 3 years to take advantage of growth opportunities. If you can double the reinvestment for the next 3 years, while holding the ROE and beta at current levels, estimate the new price to book ratio for the firm. (After year 3, the firm will revert back to the reinvestment level it has currently). (3 points)

4. You have been asked to assess whether a merger makes sense and have collected the following information on the acquiring company, the target company and the combined company, with what you believe are likely changes after the merger. The information is provided below:

	Acquiring Firm	Target firm	Combined firm (after merger)
Revenues	1500	1000	2500
EBIT (1-t) next year	150	75	250
Cost of capital	8%	10%	9%
Return on capital	12%	10%	14%
Expected growth	3%	3%	4%

a. Estimate the value of the synergy in this merger. (3 points)

b. How would your assessment of the value of synergy change, if you were told that the integration will take 5 years and that you will therefore have to wait that long before synergy manifests itself. (1 point)

c. As a final consideration, assume that you could write up the fixed assets of the combined firm by \$ 100 million after the merger, and that you can depreciate this additional amount over 5 years, using straight line depreciation. If the marginal tax rate is 40% for all firms, estimate the additional value created by this write-up. (2 points)

5. You are an entrepreneur, running a young, high-growth private business. You have valued your business at \$ 50 million, based upon expected future cash flows and growth. You need \$ 10 million in new capital to make this a reality and the venture capitalist you approach is willing to fund you in return for 15% of the ownership of the company (which is all equity funded). However, he wants the right to double his holding (from 15% to 30% of the firm), with the same dollar investment (\$ 10 million) any time over the next 5 years. You can assume that the standard deviation in firm value at publicly traded comparables is 50% and that the treasury bond rate is 5%. You can also assume that the company pays no dividends.

a. You have given the entrepreneur an option. What are the characteristics of the option?

Type of option; Call or Put

S =

K =

t =

r =

\int

= y

=

(2 points)

b. Using the Black-Scholes option pricing model, value this option. (2 points)

c. Would you agree to the terms offered by the venture capitalist? Explain why or why not. (2 points)

Equity Instruments : Final Exam

Answer all questions and show necessary work. Please be brief. This is an open books, open notes exam.

1. You have been asked to do a discounted cash flow valuation of Piedmont Coffee, a small publicly traded coffee company. The company earned \$ 20 million in after-tax operating income and reported capital expenditures of \$ 8 million and depreciation of \$ 4 million in the most recent year; non-cash working capital increased by \$ 1 million during the year. It also did a stock acquisition for \$ 5 million. At the start of the year, the book value of debt was \$ 40 million and the book value of equity was \$ 60 million.
 - a. Assuming that the current return on capital and reinvestment rate continue for the next 5 years, estimate the expected annual growth rate for the next 5 years. (2 points)
 - b. Based on this expected growth rate, estimate the expected free cash flows to the firm for the next 5 years. (1 point)
 - c. The firm is expected to have a cost of capital of 10% in perpetuity. At the end of year 5, the return on capital is expected to drop to 12% and the growth rate to 4%. Estimate the terminal value for the firm. (2 points)
 - d. Assume that the market value of debt is equal to the book value of debt and that the firm has 10 million shares outstanding. Estimate the value of equity per share today. (1 point)

2. You are now trying to value Piedmont Coffee using multiples. A regression of PE ratios against fundamentals for companies in the sector yields the following:

$$PE = 2.00 + 2.5 (\text{Expected Growth rate : next 5 years}) - 5.0 (\text{Beta}) \quad R^2 = 50\%$$
 [For example, the PE for a firm with 10% growth and a beta of 0.8 would be $23 = 2 + 2.5 (10) - 5 (0.8)$]
 Piedmont reported earnings per share of \$0.60 in the most recent year and the stock currently trades at \$12 a share. The beta for the stock is 1.20.
 - a. If the market price is right and the sector regression holds, estimate the expected growth in earnings per share for Piedmont over the next 5 years. (2 points)
 - b. At the end of year 5, Piedmont is expected to become a stable growth firm, growing 4% a year in perpetuity. If the beta for the firm will drop to 1 in stable growth, estimate the expected price at the end of year 5. (You can use the expected growth rate from part a and the sector regression to answer this question) (3 points)

3. Marley Steel is a publicly traded steel company with 20 million shares outstanding, trading at \$ 2 a share, and \$ 60 million in outstanding debt. The cost of capital for the firm was 12%. The firm is expected to generate \$ 16 million in after-tax operating income next year and is considered to be in stable growth, growing 4% a year in perpetuity.
 - a. Assuming that the firm is correctly valued by the market now, estimate the return on capital that the firm is expected to generate in perpetuity. (2 points)
 - b. You believe that if you acquire control of the firm, you can sell idle assets (that are not generating operating income) for \$ 40 million and pay down debt. If you do so, your cost of capital will decrease to 10%. Estimate the new value for the firm if you can restructure it. (2 points)

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Name:

c. How would your answer to b change, if your plan is not to pay down the debt but to redeploy the assets to more productive investments, which will increase the after-tax operating income to \$ 25 million next year. The expected growth rate will remain 4% a year in perpetuity and the cost of capital will continue to be 12%. (2 points)

4. Prius Enterprises, a publicly traded company, is considering acquiring Juniper Inc, a private company in the same business. Assume that both Prius and Juniper are stable growth companies funded entirely with equity, each with expected free cash flows next year of \$ 10 million, and each expected to grow 4% a year in perpetuity. The unlevered beta for the sector is 0.80 but only 40% of the risk in the business is market risk. The riskfree rate is 5% and the equity risk premium is 4%. (Tax rate = 40% for both firms)

a. Prius Enterprises has 5 million shares outstanding. Estimate the value per share for Prius as a stand-alone firm. (1 point)

b. Estimate the value of Juniper as a stand-alone firm to its existing owner (who is not diversified). (2 points)

c. Assume that Prius pays a premium of 50% over the estimated value of Juniper (from part b). Estimate the value per share of Prius after the transaction. (1 point)

d. Now assume that Prius will be able to write up the book value of Juniper's assets from the existing value of \$ 100 million to \$ 150 million. Assuming that these assets have five years of depreciable life left and that you use straight line depreciation, estimate the value of the additional tax savings that will accrue from the transaction.

5. You have been asked to value a new technology for producing and distributing solar power. You estimate that the technology will need an up-front investment of \$ 1.5 billion and that the expected cash flows will depend on the price of oil. For every dollar that the oil price exceeds \$ 100, the firm expects to generate \$ 20 million in annual after-tax cash flow, each year for 10 years. The expected cash flows are risky and the appropriate discount rate for these cash flows is 12%. The current oil price is \$ 110 and the standard deviation in ln (oil prices) is 30%. The riskless rate is 4%.

a. Estimate the net present value of the solar power investment at the current oil price. (2 points)

b. Now assume that you can get the exclusive rights to this technology for the next 15 years. Estimate how much you would be willing to pay for these exclusive rights? (Show the option pricing inputs below and then the value of the option following the inputs)

S =

K =

Life of the option =

Standard deviation =

Riskless rate =

Cost of delay (if any) =

Valuation : Final Exam

Answer all questions and show necessary work. Please be brief. This is an open books, open notes exam.

1. Secure Mail is a young, privately owned, software company that has developed innovative anti-virus software. The firm has never sold any of its products but has accumulated \$5 million in net operating losses over its life. You have been provided with the following estimates of revenues and pre-tax operating income for the next 5 years.

	Year 1	Year 2	Year 3	Year 4	Year 5
Revenues	\$50	\$175	\$350	\$575	\$700
Operating income	-\$6.00	-\$2.00	\$3.00	\$25.00	\$70.00

The firm is expected to remain all equity funded.

- If the tax rate for the firm is 40%, estimate the free cash flow to the firm each year for the next 5 years. (The sales to book capital ratio in this sector is 4.00) (3 points)
- Now assume that the firm is owned fully by its founder, who has his wealth tied up in the firm. Also assume that he has enough capital to fund the firm for the next 5 years. If the unlevered beta of the application software business is 1.20 and the correlation with the market is 40%, estimate the cost of equity for the firm. (The riskfree rate is 4% and the equity risk premium is 5%) (1 point)
- At the end of year 5, Secure Mail plans to make an initial public offering. If the expected growth rate after year 5 (in revenues and operating income) is 3% and the return on capital in perpetuity is expected to be 15%, estimate the terminal value (at the end of year 5). (2 points)
- Estimate the value of equity in Secure Mail today. (The firm currently has a cash balance of \$ 10 million) (2 points)

2. You are examining Valiant Automobiles, a company that reported EBITDA of -\$300 million (minus 300 million) last year. The firm is expected to turn the corner and deliver EBITDA of \$ 500 million five years from now on revenues of \$ 4 billion; the expected growth rate in EBITDA after year 5 is 4%. Valiant has \$ 1 billion in debt outstanding and a cash balance of \$ 250 million. You have run a regression of EV/EBITDA across healthy automobile companies and come up with the following:

$$EV/EBITDA = 2.50 + 50 (\text{Expected growth rate in EBITDA}) + 12 (EBITDA/Revenues)$$

(Enter percent in decimals: 5% would be 0.05)

Valiant Auto has 20 million shares outstanding, trading at \$ 10 a share. The cost of capital for the firm is expected to be 12% for the next 5 years. If you believe that the market is correctly pricing the stock and that your estimate of EBITDA and value (from the relative valuation) are right, estimate the probability that the market is assessing that the firm will not survive. (4 points)

3. You have acquired a reputation as a turn-around CEO and have been hired to fix things at a multi-business, publicly traded company. The details of the three businesses are provided below:

<i>Business</i>	<i>EBIT (1-t) next year</i>	<i>Expected growth (in perpetuity)</i>	<i>Cost of capital</i>	<i>Book Capital invested today</i>
-----------------	---------------------------------	--	------------------------	--

Retailing	60	3%	9%	400
Hospitality	30	4%	10%	300
Transportation	36	2%	8%	600

The firm has 100 million shares outstanding, \$ 600 million in debt outstanding and a cash balance of \$ 100 million.

- If you assume that the return on capital earned currently by each of these businesses continues in perpetuity estimate the value of equity per share in this firm today. (2 points)
- Now assume that you divest yourself of the transportation business for fair value (given the fundamentals) and invest that money in the retailing business. If you can preserve the fundamentals of the retail business (same return on capital, cost of capital and growth rate), estimate the new value per share. (2 points)
- How would your value per share be different if you used the proceeds from the sale of the transportation business (still assuming that the sale is at fair value) to buy back shares in the company at the value per share, instead of reinvesting in the retailing business. (The cost of capital will drop by 1% in its other businesses – from 9% to 8% for the retailing business and from 10% to 9% for hospitality). (2 points)

4. Lazarus Enterprises is a firm with 10 million voting shares and 15 million non-voting shares outstanding. You have made the following estimates for the firm, based on current management running it as well as an optimal management team in place:

	<i>Status Quo</i>	<i>Optimal Management</i>	<i>Comments</i>
EBIT (1-t) next year	80	100	Cost cutting pays off
ROC on new investment	8%	10%	Better investment choices
Expected growth rate	4%	4%	Still a mature firm
Cost of capital	9%	9%	Firm will remain all equity funded

You can assume that voting shareholders will be able to claim the entire expected value of control.

- What is the effect on the value of the firm of changing management? (2 points)
- If the voting shares are trading at a 20% premium over the non-voting shares in the market place, estimate the probability of management changing (assuming that the market prices for both classes are right) (3 points)
- Assume now that you are a private equity fund and that you plan to acquire the firm and put optimal management in place. If you believe that making the changes will take 3 years to accomplish, estimate the most you would be willing to pay per voting share? (2 points)

5. Secure Mail is the company with the anti-virus software in problem 1. If the virus software acquires a ready market, there is the possibility that Secure Mail could introduce database software to its customer base some time over the next 5 years.

- The cost of developing a database software product is estimated to be \$ 500 million (in present value dollars)

- Based on the information that Secure Mail has right now, the estimated after-tax cashflows from a database product will be \$ 40 million a year for the next 10 years; the life of the investment will be unaffected by when you take the investment. The cost of capital for the investment is expected to be 12%.
- The standard deviation in firm value is 40% for companies in the anti-virus software business, 50% in the database software business and 30% for the entire market.
- The six-month treasury bill rate is 2%, the five-year treasury bond rate is 3% and the ten-year treasury bond rate is 4%.
- There is no cost to delaying the investment.

a. If you view the database software expansion as an option, estimate the inputs to the option pricing model (3 points)

S =

K =

t =

σ =

r =

b. Use an option pricing model to value this option. (2 points)

Valuation: Final Exam

Answer all questions and show necessary work. Please be brief. This is an open books, open notes exam.

1. You have been called upon to value Dollarama Stores, a publicly traded retail firm that generated \$ 80 million in after-tax operating income in the most recent year, on book capital invested of \$ 800 million, but is facing decline. The firm expects to maintain its current return on capital but anticipates after-tax operating income to drop by 15% next year, 10% in year 2 and 5% in year 3 before stabilizing and growing 3% a year in perpetuity after the third year. The cost of capital for the firm is expected to be 12% in year 1, 11% in year 2 and 10% thereafter (forever).

- a. Estimate the free cash flow to the firm each year for the next 3 years. (2 points)
- b. Estimate the value of the firm at the end of year 3. (2 points)
- c. Assume that the firm has \$ 50 million in cash and owes \$ 100 million in debt. If there are 70 million shares outstanding, estimate the value of equity per share today. (2 points)

2. You have been asked to assess the value of equity of Listas Inc, a rapidly growing software firm. You have been supplied with the current levels and forecasted revenues and net income of the company for the next 3 years (all in millions):

	<i>Current</i>	<i>1</i>	<i>2</i>	<i>3</i>
Revenues	500	600	700	800
Net Income	50	72	98	128

You have run a regression of PE ratios against expected revenue growth and net margin across software firms in the market right now and arrived at the following:

$$PE = 4.5 + 80 (\text{Annual (CAGR) Revenue growth in next 3 years}) + 40 (\text{Current Net Profit margin}) \quad R^2=60\%$$

(The regression uses decimals. Thus, the PE for a firm with CAGR revenue growth of 10% and net margin of 20% would be $= 4.5 + 80 (.10) + 40 (.20) = 20.5$)

- a. Using this regression, estimate Listas current PE ratio. (2 points)
- b. Now assume that you can buy the stock at the PE ratio that you estimated in the last part. If the regression that you have run will still hold at the end of year 3, what will the revenue growth need to be between years 4 and 6 to allow you to generate a return on your equity investment of 25% a year for the next 3 years? (The stock pays no dividends) (4 points)

3. You have been brought in as the CEO of Zintas Technology, a firm that has both hardware and software products. You have been provided with the following information on the two divisions (in \$ million):

	Hardware	Software
EBIT (1-t) in most recent year	50	50
Book value of capital	1000	400

Expected growth rate	3%	3%
Cost of capital	9%	10%

- Estimate the status quo value of Zintas. (3 points)
- While there is nothing you can do about the existing investments in the hardware business, you plan to stop reinvesting in new investments in the hardware business. What effect will this action have on your overall firm value? (2 points)
- You are also considering doubling the reinvestment in the software business for the next 3 years, before reverting back to current levels. What effect will this have on the value of the firm? (2 points)

4. You have been asked to evaluate the value of synergy in a merger of equals and have been provided with the following information on the two firms:

	Flava	Inca
Market value of equity	800	800
Market value of debt	200	200
Cost of equity	9%	9%
After-tax cost of debt	4%	4%
Expected growth rate in perpetuity=	2%	2%
Return on capital	10%	10%

You can assume that both firms are fairly valued currently. The current riskfree rate is 4%, the equity risk premium is 5% and the marginal tax rate is 40%. You see two potential synergies:

- You believe that the combined firm will be able to generate a 12% return on capital on its new investments (but existing investments will continue to generate 10%), what value would you attach to this synergy. (You can assume that the current reinvestment rate will remain unchanged)
- You also feel that the firm will be more stable and be able to increase its debt ratio to 30%, without affecting its cost of debt.

Estimate the value of synergy in this merger, (6 points)

5. You are the sole owner of Zona Chemicals, a profitable Venezuelan chemical company and expect to generate \$ 15 million in after-tax operating income next year. You are in stable growth and anticipate a growth rate of 3% a year forever and to maintain a return on capital of 15%. Based upon your operating risk assessment, you have estimated a cost of capital of 11%.

- Estimate the value of the firm, based upon your inputs. (2 points)
- Now assume that the Venezuelan government passes a law, giving it the right to buy any Venezuelan business for \$250 million (no matter what the value of the business) any time over the next 5 years. If the standard deviation in firm value of chemical companies is 30%, how would this law affect the value you attach to your business? (The five year riskfree rate is 4% and your firm pays no dividends). (3 points)

- c. Using the output from your option pricing model, estimate the risk-neutral probability that your firm will be nationalized sometime in the next 5 years. (1 point)

Valuation: Final Exam

Answer all questions and show necessary work. Please be brief. This is an open books, open notes exam.

1. You have been asked to value LoraLee enterprises, a privately held restaurant chain that is expected to make an initial public offering in five years. You have been provided with the following information:

- ☐ The firm generated after-tax operating income of \$ 10 million on revenues of \$ 100 million in the most recent year.
- ☐ The firm is all equity funded, with all equity held by venture capitalists, and the book value of equity at the start of the most recent year was \$ 50 million.
- ☐ The unlevered beta for publicly traded firms in the sector is 1.00; the correlation of restaurants with the market is 40% but the correlation of the venture capitalists' portfolios with the market is 80%.
- ☐ The riskfree rate is 3% and the equity risk premium is 5%.

a. If you expect that after-tax operating income will grow 10% a year for the next 5 years and that the firm will maintain its current return on capital, estimate the expected cash flows each year for the next 5 years. (2 points)

b. At the end of year 5, the firm plans to go public. It plans to remain all equity funded and the return on capital will be 12% in perpetuity, after year 5. If the firm will be in stable growth, growing 3% a year after year 5, estimate the value at the end of year 5. (2 points)

c. If there is a 20% chance that the firm will not survive to go public, estimate the value of equity today, given the plan to go public in 5 years. (You can assume equity will be worth nothing if the firm does not make it. Remember also that the firm is held entirely by venture capitalists) (2 points)

2. You are evaluating Trader Jack's, a publicly traded grocery store that sells organic food. The firm is expected to report after-tax operating income of \$18 million on revenues of \$300 million and generate an after-tax return on capital of 12% next year.

a. The typical grocery store is in stable growth, growing 3% a year. It has half the after-tax operating margin, and 1.5 times the sales to capital ratio of Trader Jack's. If the median EV/Sales ratio for grocery stores is 0.40 and the market is fairly pricing these companies, estimate the EV/Sales ratio for Trader Jack's. (Assume that Trader Jack's has the same cost of capital and growth rate as the other grocery stores) (3 points)

b. You have run a regression of EV/Sales ratios against after-tax operating margins for the entire market and arrived at the following regression

$$\text{EV/Sales} = 0.35 + 15.0 (\text{Growth Rate for next 5 years}) + 7.50 (\text{After-tax operating margin})$$
 (Both growth rate and margins are entered as decimals: 5% is entered as 0.05)

Based on this regression, estimate the EV/Sales ratio for Trader Jack's today, using the growth rates and margins from part (a). (1 point)

c. Trader Jack's is considering cutting prices, with the intent of increasing both revenues and the growth rate. Assuming that the price cut will reduce the after-tax margin by 25%

and increase revenues by 10%, how much will the new growth rate over the next 5 years have to be for this policy to be value increasing for the company? (You can use the regression in part (b) to make this judgment). (2 points)

3. Keiko Inc., an entertainment company, is considering an acquisition of Matterhorn Inc., a maker of animated movies. The information on the two companies is provided below (\$ values are in millions):

	Keiko	Matterhorn
EBIT (1-t) expected next year	\$100	\$ 80
Revenues	\$1000	\$1250
Book Capital invested	\$1000	\$1000
Expected growth	3%	3%
Cost of capital	9%	9%

a. Estimate the value of the combined company, assuming no synergy in the merger. (2 points)

b. Now assume that Keiko Inc. believes that the combined company will be much stronger, relative to the competition, and will therefore be able to find more new investments in the next 4 years (doubling the reinvestment rate over that period for the combined firm) and earn a return on capital of 12% on new investments in perpetuity. (Existing investments at both firms will continue to generate their existing returns on capital) After year 4, the growth rate will drop back to 3% but the return on capital will stay at 12%. Estimate the value of synergy in this merger. (4 points)

4. You are trying to assess the value of control in Aamco, a troubled automobile parts supplies company. You have collected the following information:

- ☐ The company is expected to generate \$48 million in after-tax operating income next year, on a book value capital invested of \$ 800 million.
- ☐ The firm currently is currently extremely over levered with a debt to capital ratio of 80%. The levered beta for the stock is 2.72 and the pre-tax cost of debt is 12%. The marginal tax rate is 40%, the riskfree rate is 4% and the market risk premium is 6%.
- ☐ You believe that new management can turn the firm around by
 - Restructuring the firm's financing mix, to make it 50% debt and 50% equity. That will reduce the pre-tax cost of debt to 8%.
 - Improving the after-tax return on capital on both existing and new investments to 9%.

a. Assuming that the firm is in stable growth, growing 3% a year in perpetuity, estimate the value of the firm today. (2 points)

b. Estimate the cost of capital, if new management is able to restructure the debt in the firm (lowering the debt to capital ratio to 50% and the pre-tax cost of debt to 8%). (2 points)

c. Assuming that the firm will stay in stable growth, growing at 3% a year, even with new management, estimate the new value for the firm. (2 points)

d. Now assume that the probability of management changing is 40%, that the market value of debt today is \$400 million and there is no cash balance. Estimate the value of equity today. (1 point)

5. You are helping a vulture investor decide whether he should be investing in the equity of Grappa Steel. You have collected the following information on the firm:

- The firm reported earnings before interest and taxes of \$10 million and had depreciation charges of \$15 million.
- Mature steel companies trade at an EV/EBITDA multiple of 6. The standard deviation in enterprise value at these companies is approximately 30% and the standard deviation in equity value is 40%.
- Given the state of the market, you estimate that you will face an illiquidity discount of approximately 20% on the value of the assets liquidated.
- The firm has substantial debt outstanding. The firm has two zero coupon bonds outstanding, \$120 million (face value) in five-year bonds and 80 million (face value) in ten-year bonds.
- The treasury bill rate is 2% and the long term treasury bond rate (for both 5-year and 10-year bonds) is 4%.

a. If you consider equity as an option (to liquidate), value the equity in the firm. (2 points for the inputs; 2 points for the correct solution)

S =

K =

r =

t =

σ =

b. Now assume that you are interested in buying the bonds issued by the company. Given your analysis in part (a), estimate the probability that these bonds will default and what you would charge as a default spread (over the riskfree rate) to buy these bonds. (2 point)

Cumulative Normal Distribution

d	$N(d)$	d	$N(d)$	d	$N(d)$
-2.95	.0016	-1.00	.1587	1.00	.8413
-2.90	.0019	-.95	.1711	1.05	.8531
-2.85	.0022	-.90	.1841	1.10	.8643
-2.80	.0026	-.85	.1977	1.15	.8749
-2.75	.0030	-.80	.2119	1.20	.8849
-2.70	.0035	-.75	.2266	1.25	.8944
-2.65	.0040	-.70	.2420	1.30	.9032
-2.60	.0047	-.65	.2578	1.35	.9115
-2.55	.0054	-.60	.2743	1.40	.9192
-2.50	.0062	-.55	.2912	1.45	.9265
-2.45	.0071	-.50	.3085	1.50	.9332
-2.40	.0082	-.45	.3264	1.55	.9394
-2.35	.0094	-.40	.3446	1.60	.9452
-2.30	.0107	-.35	.3632	1.65	.9505
-2.25	.0122	-.30	.3821	1.70	.9554
-2.20	.0139	-.25	.4013	1.75	.9599
-2.15	.0158	-.20	.4207	1.80	.9641
-2.10	.0179	-.15	.4404	1.85	.9678
-2.05	.0202	-.10	.4602	1.90	.9713
-2.00	.0228	-.05	.4801	1.95	.9744
-1.95	.0256	.00	.5000	2.00	.9773
-1.90	.0287	.05	.5199	2.05	.9798
-1.85	.0322	.10	.5398	2.10	.9821
-1.80	.0359	.15	.5596	2.15	.9842
-1.75	.0401	.20	.5793	2.20	.9861
-1.70	.0446	.25	.5987	2.25	.9878
-1.65	.0495	.30	.6179	2.30	.9893
-1.60	.0548	.35	.6368	2.35	.9906
-1.55	.0606	.40	.6554	2.40	.9918
-1.50	.0668	.45	.6736	2.45	.9929
-1.45	.0735	.50	.6915	2.50	.9938
-1.40	.0808	.55	.7088	2.55	.9946
-1.35	.0885	.60	.7257	2.60	.9953
-1.30	.0968	.65	.7422	2.65	.9960
-1.25	.1057	.70	.7580	2.70	.9965
-1.20	.1151	.75	.7734	2.75	.9970
-1.15	.1251	.80	.7881	2.80	.9974
-1.10	.1357	.85	.8023	2.85	.9978
-1.05	.1469	.90	.8159	2.90	.9981
		.95	.8289	2.95	.9984

Valuation: Final Exam

Answer all questions and show necessary work. Please be brief. This is an open books, open notes exam.

1. BigDiscount inc. is a retail firm with a hundred stores, many of which are not very profitable. The company reported \$15 million in after-tax operating income on revenues of \$ 500 million and total capital invested of \$ 200 million in the most recent year. You can assume that both revenues and capital are spread equally across the hundred stores; each store accounts for \$ 5 million in revenues and has \$2 million in capital invested. The company currently has a high debt ratio (70% of capital, in market value terms) and a cost of capital of 10%.
 - a. Assume that the firm plans to shut down ten unprofitable stores each year and fully recover the capital invested in these stores. Also assume that the unprofitable stores generate an after-tax operating margin of only 1.2%. Estimate the free cash flows to the firm each year for the next 5 years, assuming that revenues per store and the current margin at each store that remains open does not change. (2 points)
 - b. At the end of year 5, BigDiscount Inc, expects to be a mature company, growing 3% a year in perpetuity and to maintain the margin and after-tax return on capital from year 5 (part a). It also hopes to bring its debt ratio down to 40% and have a cost of capital of 8% in perpetuity, after year 5. Estimate the terminal value for the operating assets. (2 points)
 - c. Given the high debt ratio, if there is a 30% probability that the firm will default sometime over the next five years. If it does default, you can expect to get only half of your invested capital back as divestiture proceeds. Assuming that the cost of capital will stay at 10% for the next five years, estimate the value of the operating assets today. (2 points)

2. United Holdings Inc. is a company in four different businesses and you have been asked to do a relative valuation of the company. You have collected the following information on United's performance in each business for the most recent year.

<i>Business</i>	<i>Revenues</i>	<i>EBITDA</i>	<i>Net Interest Expense</i>	<i>Net Income</i>
Steel	\$ 2 billion	\$ 100 million	\$ 20 million	\$ 30 million
Technology	\$ 1 billion	\$ 100 million	\$ 10 million	\$ 60 million
Chemicals	\$ 1 billion	\$ 50 million	\$ 20 million	\$ 5 million
Financial Svcs	\$ 1 billion	NA	\$ 50 million	\$ 50 million

The company has \$ 1.2 billion in debt outstanding and a cash balance of \$ 200 million. The net interest expense is allocated to each of the divisions, based upon the estimated net debt of that division. There are 100 million shares outstanding.

- a. You find comparable firms within each business and estimate the median values for different multiples for each business:

Business	Multiple used	Median value
Steel	EV/EBITDA	6.00
Technology	EV/Revenues	1.25
Chemicals	EV/EBITDA	5.00
Financial Services	PE	12

Assuming that each business of United should trade at the median value for other companies in that business, estimate the value of equity per share in United Holdings. (3 points)

- b. Now assume that you were told that the United Holdings is trading at \$25/share and that you believe that this is because the steel business at United Holdings has a much higher return on capital than the rest of the peer group. You have run a regression of EV/EBITDA for the peer group and arrived at the following:

Steel: $EV/EBITDA = 3.0 + 30 (\text{Return on capital})$

(The regression is run with decimals; a 10% growth rate is input as 0.10)

Estimate what the return on capital at United Holdings' steel business will have to be to justify the price of \$25/share. (You can assume that the other businesses at United Holdings should continue to trade at peer group medians). (3 points)

3. Celio Inc., a music production company, is considering acquiring Dellwood Inc, a manufacturer of musical instruments. Dellwood reported \$ 15 million in after-tax operating income on revenues of \$ 200 million in the most recent year and had invested capital of \$150 million at the end of the prior year. Dellwood is all equity funded and has a cost of equity of 9% (Risk free rate is 4%, the equity risk premium is 5% and the marginal tax rate is 40%). The firm is in stable growth, expected to grow 3% a year in perpetuity.

- Value Dellwood as a stand alone firm, run by its existing management. (2 points)
- Now assume that Celio is planning to fund half the acquisition with debt and that Celio's pre-tax cost of debt is 4%. Dellwood's optimal debt ratio is 20% and the firm's pre-tax cost of debt at that level will be 5%. If this is only change you see yourself making in Dellwood's operations, estimate the value of control in this acquisition. (3 points)
- You expect to be able to write up the book value of Dellwood's assets from \$125 million to \$ 150 million, after the acquisition. Assuming that you have ten years of depreciable life left in these assets, that you use straight line depreciation and that the marginal tax rate for all corporations is 40%, estimate the value of synergy from this asset write up. (2 points)

4. Sonicare is a manufacturer of electric toothbrushes and other dental appliances. In the most recent year, the firm reported after-tax operating income of \$ 20 million on total capital invested of \$250 million; the firm had capital expenditures of \$ 25 million, depreciation of \$ 15 million and non-cash working capital increased by \$ 5 million during the year. The firm is expected to maintain its existing reinvestment rate and return on capital, at least for the next five years after which the expected growth rate is expected to drop to 2% in perpetuity (with return on capital staying unchanged). The cost of capital in perpetuity for the company is 10%, it is all equity funded, and there are 10 million shares outstanding. There is no cash balance.

- Estimate the status quo value per share for the firm. (3 points)

- b. Now assume that if you ran the firm, you would dial down growth expectations immediately, and settle for stable growth in perpetuity starting now, while lowering the reinvestment rate to 20% and increasing the return on capital to 12%. You also plan to borrow \$ 120 million and buy back shares, lowering your cost of capital in perpetuity to 9%. Estimate the value of equity per share with you in charge. (3 points)
5. Please pick only one answer to the multiple choice questions (and provide a very, very short explanation, if needed) (Each is worth one point)
- a. You are valuing drug patents as options in two pharmaceutical companies. The patents both have 12 years left to expiration and roughly the same characteristics (similar present values if developed today, similar initial development costs and similar standard deviations). However, one of the companies is in a competitive environment and the other is a monopoly. In which company would you expect the patent be valued more highly (as an option) and why?
- The company in the competitive environment
 - The monopolist
 - It will be valued the same at both companies

Explanation:

- b. A gold mining company has substantial undeveloped reserves. Under which of the following scenarios would you expect the company to most quickly exploit these reserves.
- If gold prices go up and gold price volatility increases
 - If gold prices go down and gold price volatility increases
 - If gold prices go up and gold price volatility decreases
 - If gold prices go down and gold price volatility decreases

Explanation:

- c. Companies hold back on using debt capacity because they value financial flexibility, i.e., the ability to use the debt capacity to take advantage of unexpected investment opportunities. In which of the following companies does this action make the most sense?
- Companies that earn low excess returns in businesses with predictable reinvestment needs
 - Companies that earn high excess returns in businesses with predictable reinvestment needs.
 - Companies that earn low excess returns in businesses with unpredictable reinvestment needs
 - Companies that earn high excess returns in businesses with unpredictable reinvestment needs.

Explanation:

- d.* You are interested in investing in the securities of Ajax Airlines, a money losing company with significant debt obligations. You estimate that the firm generated \$8 million in EBITDA last year and that airlines typically trade at 5 times EBITDA. The average duration of the debt is 5 years and the total payments (interest and principal) on the debt (corporate bonds) are expected to amount to \$ 60 million over that period. If the risk free rate is 2% and the standard deviation in firm value for airlines is 30%, would you buy bonds in Ajax Airlines, if the market interest rate on the bonds is 11%? (3 points)

Valuation: Final Exam

Answer all questions and show necessary work. Please be brief. This is an open books, open notes exam.

1. TriCity Inc. is a publicly traded company with the following characteristics:
 - It generated \$60 million in after-tax operating income in the most recent year, on revenues of \$ 500 million.
 - The company has 100 million shares trading at \$ 4/share; the book value of equity at the start of the most recent year was \$ 300 million.
 - The company has \$ 200 million in debt outstanding currently (book value, as well as market value) and that number did not change over the course of the most recent year.
 - The company had a cash balance of \$ 100 million at the start of the most recent year, unchanged again over the course of the year.
 - The cost of capital for the firm is expected to be 12% next year, 11% the year after and 10% thereafter (in perpetuity).
 - a. You expect TriCity's after-tax operating income to grow 20% a year, each year for the next 3 years, and TriCity to maintain its current return on invested capital in perpetuity. Estimate the free cash flows to the firm each year for the next 3 years. (2 points)
 - b. At the end of year 3, you expect TriCity to be in stable growth, growing 3% a year in perpetuity, while maintaining its current return on invested capital. Estimate the terminal value at the end of year 3. (2 points)
 - c. Assume now that TriCity has 20 million options outstanding, with an average exercise price of \$ 5/share. Using the treasury stock approach, estimate the value per share for the company today. (2 points)
2. Zeller Inc. is a publicly traded retail firm with a financial arm. You have been provided with the following information on the firm's operations (in millions):

	Zeller Retail	Zeller Financial
BV of equity	\$300	\$100
BV of debt (= market value)	\$20	\$200
PV - leases	\$85	\$0
Revenues	\$500	NA
EBITDA	\$65	NA
EBIT (adjusted for leases)	\$50	NA
Net Income	\$30	\$20

- a. You have looked at publicly traded companies in the retail and the financial services businesses and arrived at the following regressions:
 Retail: $EV/Sales = 0.60 + 2.50 (\text{Pre-tax operating margin})$
 Finance: $P/BV = 0.80 + 4.00 (\text{Return on Equity})$

(Example: With a 5% pre-tax margin, $EV/Sales = 0.60 + 2.50(.05) = 0.725$)
 Assuming that Zeller Inc. has no cash balance and 50 million shares outstanding, estimate the value of equity per share. (You capitalized leases for all retail firms in the regression) (3 points)

b. Assuming that the value of equity that you compute in part (a) is a “fair” value (i.e., equal to intrinsic value), estimate the cost of equity that the market is using to value the company. (You can assume that the firm is in stable growth, growing 3% a year in perpetuity).
 (3 points)

1. Smartcell Inc. is a large market-cap smartphone manufacturer that is considering acquiring Litcell Inc. a much smaller company that develops smartphone software. Both companies are in stable growth (growing 3% a year) currently, with the following characteristics (in millions):

	SmartCell	LitCell
After-tax Operating Income next year	\$100.00	\$15.00
Book value of equity	\$400.00	\$100.00
Book value of debt (= market value)	\$150.00	\$0.00
Cash	\$50.00	\$0.00
Number of shares	100	5
Cost of capital	9%	10%

- a. Assuming that there are no synergies in the merger and that each company's shares are priced at intrinsic value, what exchange ratio (of SmartCell shares for LitCell shares) would make this a fair value acquisition? (2 points)
- b. Now assume that if Smartcell acquires Litcell, the after-tax return on capital and cost of capital of the combined company will converge on SmartCell's current return on capital (with operating income rising for the combined firm) and cost of capital. If SmartCell wants to retain 40% of the value of synergy for its stockholders, what exchange ratio should it offer? (You can assume that the stable growth rate will remain unchanged at 3%.) (4 points)
2. Dry Goods Inc. is a consumer product company that has seen its earnings plummet and is indebtedness increase over the last five years. It operates in two business, packaged goods and toiletries, with the following results (in millions):

	Packaged Goods	Toiletries	Combined firm
Invested Capital	\$600.00	\$900.00	\$1,500.00
After-tax Operating Income next year=	\$66.00	\$54.00	\$120.00
Expected growth rate in perpetuity =	2%	2%	2%

The company currently has 100 million shares trading at \$3 a share and \$ 1,200 million in market value of debt (with an 9% pre-tax interest rate on the debt) and a cost of equity of 20%; the corporate tax rate is 40%, riskfree rate is 2% and the equity risk premium is 6%. (You can assume that both businesses are equally risky)

- a. Estimate the intrinsic value per share for Dry Goods, assuming that it continues to be run as is, with its current return on capital and cost of capital remaining unchanged in perpetuity. (2 points)
- b. Now assume that there is the possibility that Dry Goods will be offered \$ 600 million for its toiletries business and if it is, it will use the proceeds to retire \$ 300 million in debt (which will lower the pre-tax cost of debt to 7% for the remaining debt) and to invest \$300 million in its packaged goods business (where it will earn the same return on capital as the existing investment in that business). Estimate the intrinsic value per share, assuming that the packaged goods business will remain a stable growth business, growing 2% a year in perpetuity. (3 points)
- c. Now assume that the current market price is correct and reflects an expectation that the restructuring in part (b) may happen. Assuming that your intrinsic value per share estimates in (a) and (b) are right, what is the probability of the restructuring happening? (1 point)
6. You are interested in investing an eight-story rental building in Manhattan. The building has 80,000 square feet of rental space and the rental income (pre-tax) next year is expected to be \$60/square foot. You can assume that the building will be fully rented out next year and that the rental income will grow 2% a year in perpetuity; the cost of capital for real estate is 8%.
- a. Allowing for a 40% tax rate, estimate how much you would be willing to pay for the building, based just on the rental income. (You can assume no reinvestment is needed) (2 points)
- b. Now assume that owning the building will give you the right to add twelve more floors, with a cumulative 100,000 square feet in rentable space, any time over the next 20 years (at which point the rights lapse). The cost of adding these additional floors today is \$ 50 million and given the state of the rental market, you believe that you will be able to get only \$40/square foot (pre-tax) as rental income for this new space, growing at 2% a year in perpetuity. However, the standard deviation in rental income (per square foot) in Manhattan over the last twenty years has been 30% and the risk free rate is 3%. Estimate how much you would be willing to pay for the rental building, with the option to add the additional floors. (2 points for inputs, 2 points for right option value)
- S =
- K =
- t =
- \int =
- r =

Valuation: Final Exam

Answer all questions and show necessary work. Please be brief. This is an open books, open notes exam.

1. Callaway Copper is a mature copper mining company. While the company is expected to be in stable growth, with revenues growing at 2.5% a year in perpetuity, its earnings are unstable and are a function of copper prices. The company has a book value of invested capital of \$1,200 million. The table below reports revenues and after-tax operating income over the last 5 years.

	Last year	2 years ago	3 years ago	4 years ago	5 years ago
Revenues	\$1,000	\$980	\$950	\$920	\$900
After-tax Operating Income	-\$120	\$325	\$330	-\$80	\$250

- a. Assume that the average after-tax operating margin over the last 5 years is a good estimate of the normalized margin and that operating margins will revert back immediately to normalized levels. The cost of capital for the firm is 7.5%. Based on these assumptions, estimate the value of the operating assets in the firm today. (3 points)
 - b. Now assume that the company has a cash balance of \$150 million, debt outstanding of \$ 500 million and a 10% holding in another mining company. That holding has a book value of \$75 million and an estimated market value of \$290 million. Estimate the value of equity in the firm today. (1 point)
 - c. Finally, assume that there is a 20% chance that the company will get nationalized in the near future and that if it is nationalized, you will receive the book value of the invested capital as your compensation. Estimate the value of equity per share today, given this danger. (2 points)
2. You are analyzing the apparel business and have separated the firms in the business broadly into brand name and generic companies. While you believe that both groups are in stable growth, growing 3% a year and have the same cost of capital and sales to invested capital ratio, the generic companies are trading at an EV/Sales ratio of 0.60 whereas the brand name companies are trading at an EV/Sales ratio of 1.40.
- a. If the generic companies are fairly priced and expect to have an after-tax operating margin of 4% next year and have a sales to capital ratio of 3.0, estimate the cost of capital for these companies. (2 points)
 - b. Now assume that brand name companies have the same cost of capital and sales to capital ratio as the generic companies and are also fairly priced. Estimate the after-tax operating margin for brand name companies. (2 points)
 - c. Finally, assume that brand name companies are considering cutting prices by 10. If this will result in an operating margin of 8%, but increase sales by 15% (holding capital constant), what effect will this have on the EV/Sales ratio of brand name companies? (2 points)

3. Zuma Inc., a small US-based consumer product company, is looking at acquiring Alta Inc., a Brazilian consumer product company. The information on the two companies is provided below:

	Zuma	Alta
After-tax Operating Income next year	\$100.00	R\$ 50.00
Invested Capital	\$800.00	R\$ 250.00
Cost of equity	9%	16%
After-tax cost of debt	3%	6%
Debt ratio	40%	20%
Expected growth	2.5%	6%

Note that Alta's cost of equity, debt and expected growth rates are all specified in \$R terms. The current exchange rate is US\$ = 2 \$R.

- Estimate the value of the combined firm in US\$ right after the acquisition, assuming that there is no synergy. (3 points)
- Now assume that as a result of the acquisition, you expect the following changes in the combined company:
 - The company will be able to cut costs and save \$10 million, while also shedding \$25 million in invested capital. The resulting return on capital can be maintained in perpetuity.
 - The company will continue to be in stable growth but the expected growth rate will be 3% in perpetuity.
 - The company's new cost of equity will be 9.5%, its after-tax cost of debt will be 3.5% and it will have a 40% debt ratio.

Estimate the value of synergy in this merger. (3 points)

4. Manza Inc. is a publicly traded company in three businesses. The details of the three businesses are provided below (in millions):

	Next year's EBIT (1-t)	Book equity	Book debt	Cost of capital	Growth rate (in perpetuity)
Steel	100	600	200	8%	2.50%
Chemicals	50	400	100	10%	2.00%
Real Estate	60	600	600	8%	3.00%

The company has no cash balance.

- Estimate the value of the operating assets of the company assuming it stays with its existing business mix (and management). (3 points)

- b. Now assume that you have been brought in as a CEO and are thinking about restructuring the company. You believe that you can divest the real estate business for 75% of book value of invested capital and reinvest half the divestiture proceeds in the steel business and the other half in the chemical business. If you can maintain the current returns on capital in each of these businesses, estimate the new value for the business. (3 points)

5. A venture capitalist is interested in investing in a young, high growth start up. You have estimated the cash flows in your business as follows:

	1	2	3	4	5	Beyond
FCFF	-\$100.00	-\$50.00	\$50.00	\$75.00	\$100.00	Grows 3% forever
Cost of capital	15%	15%	15%	15%	15%	10%

The firm currently has no debt or cash.

- a. Assume that the VC will invest \$150 million in the firm (with the cash being held by it to meet future reinvestment needs), what percentage of the company should the VC get in return (given your intrinsic valuation)? (2 points)
- b. If you do invest, you will be given the option to either (1) invest an extra \$150 million at the end of year 4 and double your ownership stake in the firm or (2) sell your current stake back to the other owners and receive half of your initial investment back at the end of year 4. If the standard deviation in firm value of publicly traded firms in this business is 30% and the risk free rate is 3%, what is the value of the option(s)? (Show the inputs to the option pricing model and then value the option(s))

Valuation: Final Exam

Answer all questions and show necessary work. Please be brief. This is an open books, open notes exam.

1. Vista Inc. is a chemical firm that generated \$15 million in after-tax operating income on \$1 billion in revenues in the most recent year. At the start of that year, it has book value of equity of \$90 million, debt outstanding of \$45 million and a cash balance of \$15 million. The company has 10 million shares outstanding today and is expected to generate its current return on capital in perpetuity. The company's cost of capital is expected to be 9% for the next 5 years.
 - a. Vista is expected to grow 15% a year for the next 5 years, while maintaining its current return on capital. Estimate the expected free cash flows to the firm each year for the next 5 years. (2 points)
 - b. Now assume that Vista's stock is trading at \$26.85/share and that the market has correctly priced the stock today and shares your views on cash flows (in part a). Estimate the terminal value for Vista (at the end of year 5) that the market is forecasting. (2 points)
 - c. Given the terminal value that you have estimated in part b, estimate the cost on capital that the market expects for Vista in perpetuity, if the growth rate forever, after year 5, is 2.5%. (2 points)
2. You are trying to assess whether the S&P 500 is correctly priced today and have collected the following information:

	Current	Average: 1981---2013
Forward PE	20	12
Return on equity	15%	12%
Expected nominal growth (in perpetuity)	3%	4%
T.Bond rate =	3%	5%

- a. Given the average values for the S&P 500 from 1981-2013, estimate the implied equity risk premium over that period. (2 points)
 - b. If the average implied equity risk premium that you estimated (in part a) is the correct equity risk premium today, how under or over valued are stocks today? (2 points)
 - c. Now assume that you believe that the Fed can keep the T.Bond rate at 3%, even as the economy improves. How high would the nominal growth rate have to be in perpetuity for stocks to be fairly valued? (2 points)
3. Gallaway Inc. is a company that is in two businesses: it produces alcoholic beverages and runs restaurants. The table below summarizes key operating metrics (\$ values in millions) for both businesses:

Business	Expected EBIT (1-t) next year	Invested Capital	Cost of capital	Expected Growth (in perpetuity)
Alcoholic	\$10	\$200	7%	2%

Beverages				
Restaurants	\$60	\$300	8%	2%

The firm is expected to have \$9 million in unallocated after-tax corporate expenses next year, growing 1.5% a year in perpetuity and the cost of capital for the entire company is 7.5%.

- Assuming that both businesses continue to earn their current return on invested capital in perpetuity, estimate the intrinsic value of Gallaway Inc. as a company. (3 points)
 - Now assume that you can have been hired as the new CEO. While you cannot do much about improving returns on existing investments in the alcoholic beverage business, you plan to stop reinvesting in that business and redirect that money into the restaurant business (while maintaining the current return on capital in the restaurant business). You also believe that you can cut corporate expenses by 50%. Estimate the value of Gallaway after the restructuring. (3 points)
4. Delta Appliances, a publicly traded appliance manufacturer, is considering an acquisition of CafeCoz, a privately owned appliance manufacturer. You have been provided with the following information:

	Delta Appliances	CafeCoz
After-tax operating income next year	\$10 million	\$ 5 million
Debt/Capital ratio	20.00%	0.00%
Invested Capital	\$100 million	\$25 million

Both companies are in stable growth, growing 3% a year. The risk free rate is 3% and the equity risk premium is 5%. The appliance sector has an unlevered beta of 0.80 and a correlation of 0.40 with the market. The marginal tax rate for all firms is 40%.

- Value Delta Appliances as a stand alone company. (2 points)
 - Value CafeCoz as a stand alone company to its existing owner, who is undiversified. (2 points)
 - Delta plans to acquire CafeCoz, paying twice the owner's estimated value (from part b) for the company, using a 20% debt to capital ratio (with the after-tax cost of debt remaining at 3%). Estimate the value of Delta Appliances after the transaction. (2 points)
5. SpiceAir Inc. is a publicly traded airline that is burdened with \$1 billion in debt (face value), with a weighted-average duration of approximately 4 years. The company is losing money but has substantial assets that you have valued as following:

Assets	Estimated Going concern (DCF) value	Liquidity Discount
Aircraft	\$250 million	20%
Airline routes	\$400 million	0%
Other assets	\$150 million	25%

The standard deviation in asset value for airlines is 50% and the risk free rate is 3%.

a. If the debt trades at a discount of 40% on face value, and the company has no cash balance, estimate the going concern (DCF) value of equity in the company. (1 point)

b. Given the market value of the debt, estimate the probability of default that the bond market is attaching to the company. (1 point)

c. Estimate the value of equity in SpiceAir as a liquidation option. (2 points for inputs, 2 points for correct option value)

S = Value of the underlying asset =

K = Strike price =

t = Life of the option =

Standard deviation =

r = Riskless rate =

Valuation: Final Exam

Answer all questions and show necessary work. Please be brief. This is an open books, open notes exam.

1. You are valuing Trent Oil, a small, publicly traded oil company. The company reported \$250 million in after-tax operating income in the most recent year on revenues of \$ 5 billion. The company also reported having \$500 million in book equity, \$1 billion in debt (book and market) and a cash balance of \$250 million.
 - a. During the most recent year, oil prices averaged \$110/barrel, but the current oil price is \$60/barrel. Regressing after-tax operating income (in millions) at Trent Oil against oil prices (\$/barrel) over the last 25 years, you have arrived at the following:
 After-tax Operating Income = $30 + 2.00 (\text{Price/Barrel of Oil}) \quad R^2 = 90\%$
 Assuming that you want to value Trent Oil at the current oil price (which you feel is the new normal), and that Trent Oil is a mature company, growing at 1.5% a year, estimate the value of Trent Oil's operating assets. (You can assume that the cost of capital for a small oil company is 7.5%)

(3 points)
 - b. Now assume that you are given the following additional information:
 - Trent Oil owns 20% of RigWorks, an oil services company, and the holding is classified as a minority, active investment and this equity holding is recorded on Trent Oil's balance sheet as having a value of \$50 million (in book value terms). RigWorks is a mature company growing at 2% a year, with a ROE of 14% and a cost of equity of 8% in perpetuity.
 - Trent Oil has 100 million shares outstanding as well as 10 million employee options. While you don't have the information to value the options, they have a strike price of \$10/share and five years to maturity.
 Estimate the value per share in Trent Oil. (3 points)

2. You are examining Retail ETFs (exchange traded funds) and have compiled the following information on three of the ETFs.

	All Retail ETF	Luxury Retail ETF	Online Retail ETF
EV/Sales	0.90	2.25	7.50
After---tax operating margin (next year)	6.00%	16.00%	NA
Sales/Capital Ratio	2.00	1.25	6.00
Expected growth rate in operating income	3.00%	3.00%	NA
Life Cycle	Mature	Mature	High Growth

- a. If you assume that the All Retail ETF is priced fairly, estimate the cost of capital for a typical retail firm. (2 points)

- b. Now assume that you believe that luxury retailers have a 10% cost of capital. How under or over valued is the luxury retail ETF? (2 points)
- c. Finally, consider online ETFs, which are showing high revenue growth, while losing money today. While you are unable to estimate an intrinsic EV/Sales ratio, a regression of all retail firms yields the following:

$$EV/Sales = 1.80 + 25.0 (\text{Annual Revenue growth rate}) - 15.0 (\text{Cost of Capital})$$
 (Enter percentages as decimals in the regression, 15% is entered as .15)
 If the cost of capital for online retailers is 12%, estimate the annual growth rate you would need in revenues to justify today's EV/Sales ratio. (2 points)
3. You have been just hired as CEO of Mirra Inc., a conglomerate that operates in three businesses. The details of the businesses are provided below:

	<i>Entertainment</i>	<i>Movie Theaters</i>	<i>Travel Services</i>	<i>Company</i>
Revenues (millions)	\$400	\$300	\$300	\$1,000
Operating Income (next year in millions)	\$100	\$30	\$50	\$180
Effective tax rate	36%	20%	36%	33.33%
After-tax Operating Income (next year in millions)	\$64	\$24	\$32	\$120
Invested Capital (in millions)	\$500	\$400	\$100	\$1,000
Expected Growth Rate	3.00%	3.00%	3.00%	3.00%
Cost of capital	10.00%	8.00%	7.00%	9.00%

- a. What is the value of the consolidated company, using the combined company's cash flows and cost of capital? (2 points)
- b. What is the value of Mirra as the sum of its parts, using the divisional cash flows and the industry average cost of capital for each division? (3 points)
- c. If you are getting a different value for Mirra in part b, where is the difference coming from? (1 point)
- A conglomerate discount is being applied by the market.
 - The broken-up businesses will be run more efficiently as stand alone units
 - The combined company has a less optimized capital structure than that the individual units could have.
 - The broken-up businesses will pay less in taxes than the combined company
 - The broken-up businesses will have higher growth than the combined company
 - All of the above
4. You have been asked to assess the value of synergy in a merger of two entertainment companies, StreamTV, a company that streams only horror movies and DigiMovies, a maker of zombie/cult movies. The details of each company are provided below:

	StreamTV	DigiMovies
Business	Streaming	Content
Revenues (in millions)	\$1000	\$800
Pre-tax operating income (this year in millions)	\$100	\$60

Effective tax rate	40.00%	20.00%
Invested capital (in millions)	\$800.00	\$400.00
Expected growth rate	2%	2%
Cost of capital	10%	10%

- a. Estimate the value of the Stream TV as a standalone firm. (1 point)
- b. Estimate the value of DigiMovies as a standalone firm. (1 point)
- c. Now assume that the combined company is planning to do the following:
 - Hire more movie production staff, increasing operating expenses (pre-tax) by \$10 million immediately.
 - The resulting pre-tax operating income will grow at 5% a year for the next five years. However, the combined company will reinvest the same amount (in dollar terms) that the standalone companies would have invested collectively over the next five years.
 - Move operations to Singapore (which is DigiMovies base) and lower the effective tax rate to 20% for all of the company's income. The company will face an upfront cost (legal and other) of \$150 million to make this move.

After year 5, the growth rate is expected to drop back to 2% and the return on invested capital will be whatever the company is expected to generate based on operating income and invested capital in year 5. Estimate the value of synergy in this merger. (4 points)

5. The following three questions are all related to real options.

- a. We used the option to delay framework to value patents. Assume that you have a 20-year patent on a diabetes drug, with 12 years left to expiration. You have already spent \$250 million on R&D and believe that you will need to spend an additional \$ 500 million to make it commercially viable. The net present value of this investment, if developed today, is -\$50 million. If the standard deviation in stock prices is 40% and the standard deviation in firm values is 30% for drug companies, estimate the values that you would use for the following in an option price model. (1 point)
 - i. S (Value of underlying asset) =
 - ii. K (Strike price) =
 - iii. t =
 - iv. Standard deviation =
 - v. Cost of delay (if any) =
- b. Redix Inc. is a company that has no debt and a cost of equity of 10%. You have computed an optimal debt ratio of 40% for the company and a cost of capital of 9% at that optimal ratio. Redix argues that it should stay under levered because of the value of financial flexibility. In which of the following scenarios would this argument make the most sense? (1 point)
 - i. Redix has wide access to capital, predictable reinvestment needs and earns a return on capital greater than its cost of capital.
 - ii. Redix has limited access to capital, predictable reinvestment needs and earns a return on capital greater than its cost of capital.
 - iii. Redix has limited access to capital, unpredictable reinvestment needs and earns a return on capital greater than its cost of capital.
 - iv. Redix has wide access to capital, predictable reinvestment needs and

earns a return on capital less than its cost of capital.

- v. Redix has limited access to capital, predictable reinvestment needs and earns a return on capital less than its cost of capital.
 - vi. Redix has limited access to capital, unpredictable reinvestment needs and earns a return on capital less than its cost of capital.
- c. Best Buy (a US electronics retailer) is considering buying Zee TV, an Indian electronics company with exclusive rights to sell Apple products in India, for \$2.25 billion. Zee TV is a mature company, with an expected after-tax cash flow of \$150 million, next year, growing 3% (in US dollar terms) a year in perpetuity, with a cost of capital of 13%. As part of the acquisition, Best Buy can also get the exclusive right to double the number of Zee TV stores and its expected after-tax cash flows (in perpetuity) by investing an extra \$ 1 billion any time over the next five years. If the standard deviation in firm value in electronic stores is 40% and the five-year risk free rate is 3%, should Best Buy go through with this acquisition? (4 points)

Final Exam: Valuation

Answer all questions and show necessary work. Please be brief. This is an open books, open notes exam.

1. You have been asked to value Dexia Financials, a small, high growth bank, and are told that Dexia generated \$150 million in net income in the most recent year on a book value of equity of \$ 750 million; you can assume that the book value of equity is equal to the regulatory capital of the bank and that it has risk-adjusted assets of \$ 5 billion right now.
 - a. Dexia expects its risk adjusted assets and net income to grow 10% a year for the next five years and plans to increase its regulatory capital ratio to 20% of risk-adjusted assets by the end of year 5 (with the ratio changing in equal annual increments over the five years). Estimate the FCFE of Dexia each year for the next 5 years. (2 points)
 - b. After year 5, Dexia expects to be a mature bank, growing 3% a year in perpetuity, while continuing to earn the return on equity that it had at the end of year 5. If the cost of equity for mature banks is 9%, estimate the value of equity at the end of year 5. (2 points)
 - c. If Dexia expects to have a cost of equity of 12% for the next 5 years, estimate the value per share, assuming that Dexia has 50 million shares and 10 million options outstanding (with a strike price of \$20 each) today. (2 points)

2. PeopleMeet is a social media company that currently has 10 million users but reported an operating loss of \$5 million on \$10 million in revenues in the most recent year, mostly from advertising. The company expects revenues to grow 80% a year for the next 5 years and its pre-tax operating margin to improve to 20% of revenues by year 5. After year 5, you expect revenue growth to drop to 10% a year for the following 5 years and margins to stay stable. (The company has no debt and no cash balance.)
 - a. You have run a regression across more established advertising companies to arrived at the following regression (with all percentage numbers entered as decimals, i.e., 20% will be entered as 0.20):

$$\text{EV/Sales} = 0.80 + 45.0 (\text{Expected annual revenue growth in the next 5 years}) + 25.0 (\text{Pre-tax Operating Margin}) - 1.5 (\text{Earnings Loss Dummy})$$

where the earnings loss dummy is set equal to one if the company is reporting an operating loss and zero if it is not. Using this regression and current numbers, estimate the value of PeopleMeet today. (2 points)
 - b. Using the same regression, estimate the enterprise value of PeopleMeet at the end of year 5, based upon your expectations for what the company will look like then. (2 points)
 - c. Now assume that the cost of equity for PeopleMeet is 15% for the next 5 years and 10% beyond. If there is no chance that the company will fail over the next 5 years and your estimates from parts a and b are both correct, estimate how much new equity (in PV terms) the company will have to issue over the next 5 years. (You can assume that the company will have a 20% debt to capital ratio at the end of year 5). (2 points)

3. You have been asked to look at a merger of two pharmaceutical companies, Griffin and Leblow Inc., and have been provided the following information on them (with all dollar values in millions of dollars):

	<i>Griffin</i>	<i>Leblow</i>
Revenues	\$2,000	\$1,000
Expected EBIT next year	\$200	\$150
Tax rate	40%	40%
Beta (Levered)	1.2	1.2
Debt to capital ratio	20%	20%
Cost of equity	9.20%	9.20%
Pre-tax cost of debt	4.00%	4.00%
Expected growth rate (& Risk free rate)	2%	2%
Invested capital	\$1,200.00	\$900.00

- Estimate the value of Griffin as a stand-alone company. (1.5 points)
 - Estimate the value of Leblow as a stand-alone company. (1.5 points)
 - Now assume that the combined company will be able to cut S,G&A expenses by \$70 million next year, while keeping expected growth intact. In addition, the combined company will be able to use its larger size (and stability) to increase its debt to capital ratio to 30%, without affecting its pre-tax cost of debt. Estimate the value of synergy in this merger. (2 points)
4. You have been asked to assess a potential buyout of Dryden Inc., a manufacturer of condiments. The company currently is managed very conservatively, with no debt and \$400 million in invested capital, all in the United States. It also expects to generate \$60 million in pre-tax operating income on \$500 million in revenues, all in the United States, next year. The risk free rate is 2.5%, the marginal and effective tax rates for US income is 40% and the equity risk premium for the US is 6%. The beta for the stock is 1.00.
- If the firm expects operating income to grow at 2.5% forever, estimate the value of the company's operating assets. (2 points)
 - GeoFund, a Brazil-based private equity fund is considering buying out Dryden and making significant changes to the company:
 - The company plans to move its headquarters to Brazil, lowering the effective tax rate on earnings for the entire company to 30%.
 - GeoFund expects to invest \$100 million immediately to expand into the Brazilian market. The expansion is expected to generate \$250 million in additional revenues in Brazil next year and these revenues are expected to grow 2.5% a year in perpetuity thereafter. The pre-tax operating margin on Brazilian sales is expected to be only 8%.
 - The company plans to increase its debt to capital ratio to 20%, though it will keep all of its debt in the US (where the marginal tax rate is 40%). The pre-tax cost of debt is 4.5% and the country risk premium for Brazil is 3%.
 What is the most that GeoFund can afford to pay for Dryden? (4 points)
5. IOL is an internet service provider that has hit a plateau in terms of users and revenues. In the most recent year, it had 10 million users, each of whom paid \$200/year for the service. The company's income statement and balance sheet are below (in millions).

Name:

	<i>Most recent year</i>		<i>Start of most recent year</i>
Revenues	\$2,000	Net Fixed Assets	\$1,300
EBITDA	\$500	Cash	\$100
EBIT	\$400	Non---cash Current Assets	\$200
Interest expenses	\$50	Total Assets	\$1,600
Taxable Income	\$350	Non---debt Current Liabilities	\$100
Taxes	\$105	Debt	\$500
Net Income	\$245	Equity	\$1,000
		Total Liabilities	\$1,600

The tax rate paid in 2014 is the effective tax rate. The risk free rate is 2%, the cost of capital for IOL is 8%

a. If IOL expects to generate a 2% growth rate in perpetuity (from increasing user fees), while maintaining its existing return on capital, estimate the value of its operating assets.

(2 points)

b. Now assume that if IOL has the rights (for the next 10 years) to a proprietary technology that it can use to provide streaming media services (a mini Netflix) to its current users. The initial investment needed in infrastructure and media content is \$4 billion, depreciable straight line over 10 years, and while the service will not attract any new users to IOL, it will allow IOL to charge more for its service. A market testing survey suggests that users will be willing to pay an additional \$50 a year for the service, but there is substantial uncertainty in this estimate (standard deviation is 30%). Estimate the value of the proprietary technology to IOL. (You can assume that there you will be able to generate ten years of revenues from the service, once initiated, and that there is no cost to delaying initiation.) How much would you willing to pay as a premium for IOL because it owns these rights? (4 points)

Valuation: Final Exam

Answer all questions and show necessary work. Please be brief. This is an open books, open notes exam.

1. You are trying to value Cyclops Oil and have collected the following information:
- In the most recent twelve months, the company reported an after-tax operating loss of \$52.5 million on revenues of \$2.1 billion. During those twelve months, oil prices averaged \$45/barrel.
 - The company has a book value of equity of \$1,800 million, book value of debt of \$1,000 million and a cash balance of \$800 million

The oil price has rebounded to \$70 a barrel and you have run regressions of Cyclop's revenues and operating margins against oil price/barrel and the results are below:

Cyclops Revenues (in millions) = $100 + 50.00 (\text{Oil Price/barrel})$

Cyclops After-tax Operating Margin (in decimals) = $-0.25 + 0.005 (\text{Oil Price/barrel})$

The cost of capital for the company is 10% in perpetuity.

- Assume that you want to be oil price neutral, i.e., value the company given the oil price today. If you expect the oil-price neutral earnings to grow 6% a year for the next three years, while maintaining this normalized return on capital, estimate the free cash flows to the firm for the next three years. (3 points)
- After year 3, the company expects the business to be in secular decline and operating earnings to decline 3% each year in perpetuity. If you assume that the company will be able to sustain its return on capital in perpetuity, estimate the terminal value (at the end of year 3). (1.5 points)
- Estimate the value per share today, if there are 100 million shares outstanding. (1.5 points)

2. You are trying to price a Crest Technologies, a start-up and have the following projections (in millions) for the next five years:

	1	2	3	4	5
Revenues	\$10.00	\$50.00	\$100.00	\$250.00	\$500.00
EBITDA	\$(25.00)	\$(40.00)	\$(50.00)	\$(20.00)	\$50.00
Tax Rate	0%	0%	0%	0%	30%
FCFF	\$(50.00)	\$(100.00)	\$(150.00)	\$(100.00)	\$(25.00)
Cost of capital	12%	12%	12%	12%	12%

You have run a regression of EV/EBITDA against tax rate and EBITDA margin (EBITDA/Sales) for more established firms in the business and have the following:

$EV/EBITDA = 10.00 + 90.00 (\text{EBITDA Margin}) - 10.00 (\text{Tax Rate})$

[All numbers in the regression are entered in decimals, i.e., 20% is 0.20]

- If the cost of capital is 12% and you have \$50 million of net debt outstanding today, estimate what you would pay for equity today, based upon your expected pricing in year 5 and incorporating the effect of cash flows for the next five years. (3 points)
- The negative cash flows that are forecast for the next five years are called "cash burn" and will require fresh capital to be raised. Assuming that the company plans to issue only equity to meet these needs, estimate how much of a discount you are already applying to your equity value (in part a) to reflect this dilution? (1.5 points)
- Now assume that there is a chance that capital markets will freeze up, making it impossible to raise capital and that the probabilities of that happening, by year, are below:

Name:

Year	1	2	3	4	5
Probability of capital freeze	15%	10%	10%	5%	5%

Estimate the value of equity with this probability considered, assuming that if capital is unavailable, the business will have to shut down and equity will be worth nothing. (1.5 points)

3. You are valuing Dalco Drugs, a pharmaceutical company with a large cosmetics business. Due to legal and political pressures, the company has had to show restraint in pricing in both divisions. The table below summarizes the key operating numbers for both divisions:

	Pharmaceuticals	Cosmetics
Revenues (in millions)	\$1,500	\$1,000
After-tax Operating Income next year (millions)	\$90	\$120
Invested Capital (millions)	\$900	\$ 1000
Beta	1.44	1.92
Cost of equity	11.64%	14.52%
Cost of capital	8.32%	9.76%

The net debt in Dalco is currently \$ 1.2 billion in market value terms. The risk free rate is 3% and the equity risk premium is 6%. The tax rate is 40%.

- a. Value the equity in the company today, with its operating mix intact, assuming that both divisions will grow 3% a year forever, while maintaining their current returns on invested capital. (3 points)

Name:

- b. Now assume that you plan to sell the pharmaceutical business for \$1.2 billion and use the proceeds to pay off all its debt. After the divestiture, the company will be able to raise cosmetics prices, thus increasing the after-tax operating margin to 15% for that business. Assuming that the growth rate remains 3%, estimate the value of equity in the company after the sale. (3 points)
4. You have been asked to estimate the value of synergy in the merger of DirectCom, a movie streaming firm, and Movie Magic, an entertainment company and have been provided with the following information on the two companies:

	DirectCom	Movie Magic
Revenues (millions)	\$750.00	\$250.00
After-tax Operating Income next year (millions)	\$60.00	\$30.00
Cost of capital	9.00%	8.00%
Return on capital	7.50%	6.00%
Net Debt (millions)	\$100.00	\$50.00
Number of shares (millions)	125	50

Both firms are in stable growth, growing 3% a year in perpetuity.

- Estimate the value per share of DirectCom, prior to the merger. (1 point)
 - Estimate the value per share of Movie Magic, prior to the merger. (1 point)
 - Now assume that combining the two firms will be able to cut annual operating expenses by \$18 million (on an after-tax basis), though it will take three years for these costs savings to show up. Estimate the value of synergy in this merger. (3 points)
 - Assume that both companies were fairly priced before the acquisition and that DirectCom pays a 40% premium over market price to buy Movie Magic. Estimate the value per share for DirectCom after the acquisition. (1 point)
5. You are a private equity investor considering making a large infrastructure investment that will be done in two phases, with you preserving the option to back out of the investment after the first phase, if you so decide.
- The initial cost for phase 1 is \$1.5 billion and you expect to generate \$250 million in after-tax cash flows next year, growing at 2% for the next four years. Phase 1 ends after year 5.
 - If you choose to go on to phase 2, you have to invest an additional \$ 4.5 billion into the project at the end of year 5, bringing your total investment to \$6 billion, and you will be entitled to the cash flow from the project in perpetuity. Based on what you know now, you expect your year 5 cash flow to grow at 2% a year forever.

The risk free rate is 2% (for all maturities), the cost of capital is 10% for both phases and the standard deviation in project cash flow (and in value) is 20%.

- What is the net present value of the first phase of the investment? (2 points)
- What are the parameters that you would use to value the option to invest in the second phase? (Estimate each input into the option pricing model) (2 points, with ½ point off for each wrong input)
 Value of underlying asset (S) =
 Strike Price (K) =
 r =
 Life of the option (t) =
 Standard deviation (σ) =

Name:

Cost of delay (y), if any =

- c. Value the option and evaluate whether you would make this investment. (2 points)

Valuation: Final Exam

Answer all questions and show necessary work. Please be brief. This is an open books, open notes exam.

- Solar Circuits is a manufacturing company that generated \$75 million in after-tax operating income in the most recent year. It had book equity of \$450 million, debt outstanding (book and market) of \$150 million and a cash balance of \$100 million. The company expects to maintain its existing return on capital in perpetuity. It also expects its after-tax operating income to grow 12% a year for the next 3 years, and 3% thereafter. If the cost of capital for the firm is 9%, estimate the value of equity today. (4 points)
- Chiara Inc, is a money-losing start-up with no revenues in the most recent year that expects high revenue growth, improving margins and changing costs of equity (it plans to say all equity-funded):

	1	2	3
Revenues (\$ millions)	\$200	\$300	\$350
Operating Margin (pre-tax)	-5%	5%	10%
Cost of equity (capital)	15%	12%	9%

If you believe that the appropriate sales/capital ratio for the company is 2.00, estimate **the present value of the expected free cash flows over the next 3 years**. The marginal tax rate is 25% and you can assume that the company does not have any NOLs to carry forward right now. (4 points)

- You are trying to price Giraldo Vineyards, a publicly traded Argentine wine company, but your peer group is composed entirely of US vineyards. The summary statistics (all in US \$ terms) are below:

	<i>Giraldo Vineyards</i>	<i>Publicly traded US Vineyards</i>
PE	9.00	15.00
ROE	15.00%	12.00%
Expected growth rate	3.00%	3.00%

Assuming that both Giraldo Vineyards and the US companies are mature (growing at a constant rate forever) and that the US peer group is fairly priced, given its fundamentals, **how under or over priced is Giraldo Vineyards, relative to the US peer group?** (You can assume that the cost of equity for Argentine companies is 3% higher than the cost of equity for the US peer group). (4 points)

- LVT Inc. is a conglomerate in three different businesses and you have information on revenues and operating income by business, as well as peer group regressions that you have run on EV/Sales across companies within each business:

Business	Revenues	Operating Income	EV/Sales Peer Group Regression
----------	----------	------------------	--------------------------------

Leisure	\$300.00	\$30.00	EV/Sales = 2.25 + 10.00* Operating Margin
Business Services	\$500.00	\$25.00	EV/Sales = 0.45 + 8.00* Operating Margin
Technology	\$200.00	\$50.00	EV/Sales = 2.50 + 6.00* Operating Margin

(In the regressions, percentages are converted to decimals; 20% would be 0.20)

The company does have corporate expenses that have not been allocated to any of the businesses and expects these expenses to be \$8 million next year, after taxes, every year in perpetuity. Estimate how much you would be willing to pay for the equity in this firm, if it has \$400 million in debt outstanding and a cash balance of \$100 million. The cost of capital for the company is 8%. (4 points)

5. Narnia Enterprises is considering an acquisition of Aslan Inc, motivated by the possibility of synergy. You are given the following estimates for key numbers the two firms (with all dollar values in millions):

	Narnia	Aslan
EBIT (1-t) next year	\$160	\$40
Expected growth rate (perpetuity)	2%	2%
Invested Capital	\$1,600	\$500
Cost of capital	8%	8%

After the merger, Narnia believes that it can sell Aslan's distribution system for book value; this **system accounts for \$100 million in invested capital and is expected to have after-tax operating expenses of \$10 million next year**, without affecting growth or cost of capital. Assuming that both companies were fairly valued before the merger and that Narnia paid a 50% premium (over value) to acquire Aslan, how much value did this merger create or destroy for Narnia's stockholders? (4 points)

6. You have been asked to assess Giant Foods, a mature US-based food company, that has been targeted by activist investors. You have the following information on the company, run by the existing management, as well as what the activist investors are pushing for, in terms of change in operations and financing:

	Status Quo	Activist Plan
EBIT (1-t) next year	\$100.00	\$100.00
Reinvestment Rate	50%	20%
Return on Capital	5%	10%
Debt to Capital	0%	20%

The current cost of capital is 7.9% and the activists believe that the company can borrow money at 4%, pre-tax, if it moves to a 20% debt ratio, **If there is a 60% chance that the activist investors will be able to push their changes through, but with a 2-year period before change actually happens, estimate the expected value of operating assets today.** (The risk free rate is 2.5%, the equity risk premium is 6%, and the marginal tax rate is 25%). (5 points)

7. You are interested in investing in Selia Drugs, a money-losing company with a significant debt load and have collected the following information:

- The company is expected to have negative FCFF of -\$30 million each year for the next three years, before turning operations around, and delivering \$50 million in FCFF in year 4, growing 2% a year in perpetuity.
- The cost of capital for all drug companies is 9%.
- The company has \$750 million in debt outstanding (face value), with an average duration of five years.
- The current 5-year treasury bond rate is 2%.

Assuming that you view the equity in Selia Drugs to be an option and that you (or I) have estimated the following numbers (approximated & rounded) for $d1$ and $d2$ (in option pricing model).

$$d1 = 0.05 \qquad d2 = -0.85$$

Using the cumulative normal distribution on the next page, estimate the fair interest rate to charge on its debt. (5 points)

Cumulative Normal Distribution table

d	$N(d)$	d	$N(d)$	d	$N(d)$
-3.00	0.0013	-1.00	0.1587	1.05	0.8531
-2.95	0.0016	-0.95	0.1711	1.10	0.8643
-2.90	0.0019	-0.90	0.1841	1.15	0.8749
-2.85	0.0022	-0.85	0.1977	1.20	0.8849
-2.80	0.0026	-0.80	0.2119	1.25	0.8944
-2.75	0.0030	-0.75	0.2266	1.30	0.9032
-2.70	0.0035	-0.70	0.2420	1.35	0.9115
-2.65	0.0040	-0.65	0.2578	1.40	0.9192
-2.60	0.0047	-0.60	0.2743	1.45	0.9265
-2.55	0.0054	-0.55	0.2912	1.50	0.9332
-2.50	0.0062	-0.50	0.3085	1.55	0.9394
-2.45	0.0071	-0.45	0.3264	1.60	0.9452
-2.40	0.0082	-0.40	0.3446	1.65	0.9505
-2.35	0.0094	-0.35	0.3632	1.70	0.9554
-2.30	0.0107	-0.30	0.3821	1.75	0.9599
-2.25	0.0122	-0.25	0.4013	1.80	0.9641
-2.20	0.0139	-0.20	0.4207	1.85	0.9678
-2.15	0.0158	-0.15	0.4404	1.90	0.9713
-2.10	0.0179	-0.10	0.4602	1.95	0.9744
-2.05	0.0202	-0.05	0.4801	2.00	0.9772
-2.00	0.0228	0.00	0.5000	2.05	0.9798
-1.95	0.0256	0.05	0.5199	2.10	0.9821
-1.90	0.0287	0.10	0.5398	2.15	0.9842
-1.85	0.0322	0.15	0.5596	2.20	0.9861
-1.80	0.0359	0.20	0.5793	2.25	0.9878
-1.75	0.0401	0.25	0.5987	2.30	0.9893
-1.70	0.0446	0.30	0.6179	2.35	0.9906
-1.65	0.0495	0.35	0.6368	2.40	0.9918
-1.60	0.0548	0.40	0.6554	2.45	0.9929
-1.55	0.0606	0.45	0.6736	2.50	0.9938
-1.50	0.0668	0.50	0.6915	2.55	0.9946
-1.45	0.0735	0.55	0.7088	2.60	0.9953
-1.40	0.0808	0.60	0.7257	2.65	0.9960
-1.35	0.0885	0.65	0.7422	2.70	0.9965
-1.30	0.0968	0.70	0.7580	2.75	0.9970
-1.25	0.1056	0.75	0.7734	2.80	0.9974
-1.20	0.1151	0.80	0.7881	2.85	0.9978
-1.15	0.1251	0.85	0.8023	2.90	0.9981
-1.10	0.1357	0.90	0.8159	2.95	0.9984
-1.05	0.1469	0.95	0.8289	3.00	0.9987
-1.00	0.1587	1.00	0.8413		

Problem 1

You have been asked to value Amway Inc., a company that generated \$150 million in after-tax operating income in the most recent year, on invested capital of \$ 1 billion. You have been given the following estimates of operating income (and growth) over the next four years:

	<i>Last 12 months</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4 & beyond</i>
Growth in operating income		12%	9%	6%	3%
After-tax Operating income	\$150.00	\$168.00	\$183.12	\$194.11	\$199.93

Assuming that the firm can maintain its current return on invested capital in perpetuity, and that its cost of capital is 8% forever, estimate **the value of the operating assets today**.

Problem 2

You are trying to estimate the cash flows a software company that has lots of potential. You have estimated the expected revenues and pre-tax operating margins for the next five years.

	<i>Last 12 months</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
Revenues (in millions)	\$0.00	\$200.00	\$300.00	\$360.00	\$400.00	\$420.00
Operating Margin	0%	-20%	-5%	5%	15%	30%

You expect the company to maintain a sales to capital ratio of 2.00 for the next five years, and that the marginal tax rate is 25%. Assuming that the company has no operating losses to carry forward, estimate **the free cash flows that the firm will generate, each year over the next five years**. (The company currently has no NOL to carry forward)

Problem 3

Gottfried Bank is a small bank that expects to generate net income of \$120 million next year on book equity (also regulatory capital) of \$750 million, and is expected to grow 2% a year in perpetuity. Its current market capitalization is \$ 2 billion, and you can assume that it is correctly priced. Assume a new regulatory capital regime will require the bank to increase its regulatory capital by \$50 million immediately, and that the firm's net income next year and expected growth remain unchanged. Estimate the new price to book ratio for the firm.

Problem 4

You have run a regression of EV/Invested Capital across all steel companies and arrived at the following result:

EV/Invested Capital = 5.00 + 40.00 (Return on Invested Capital) -10.00 (Reinvestment Rate)

(Percentages are entered as decimals. Thus, if your ROIC is 18%, enter .18 in the regression)

You are trying to use this regression to price Rahway Steel, a company with the following financial statements

	<i>Expected next year</i>		<i>Last year</i>	<i>Current year</i>
Revenues	\$400.00	Cash	\$40.00	\$100.00
- Operating Expenses	\$300.00	Other Current	\$160.00	\$200.00
Operating Income	\$100.00	Fixed Assets	\$400.00	\$450.00
- Interest Expenses	\$20.00			
Taxable Income	\$60.00	ST & LT Debt	\$100.00	\$200.00
- Taxes	\$15.00	Other Current	\$120.00	\$150.00
Net Income	\$45.00	Equity	\$360.00	\$400.00

Estimate the price of Rahway Steel's equity, if the company is correctly priced, relative to the sector. (You can assume book debt = market debt)

Problem 5

Clover Corporation is a multi-national that is seeing very different prospects in different parts of the world.

<i>Region</i>	<i>Currency of valuation</i>	<i>Current Exchange Rate</i>	<i>Inflation Rate</i>	<i>Expected FCFF next year</i>	<i>Expected growth rate forever</i>
Brazil	Brazilian Real	5 BRL/\$	6%	R\$ 400.00	7.00%
United States	US \$	NA	2%	\$120.00	2.00%
Germany	Euro	0.80 Euros/\$	1%	€80.00	-3.00%

The company's cost of capital is 8% in US dollar terms for all of its geographic regions. The company's headquarters are in the United States, and its corporate expenses are expected to be \$45 million (after-taxes) next year, growing at 2% a year in perpetuity. Estimate the **value of all of the company's operating assets, in US dollars, today**.

Problem 6

Hamlin Inc, a steel company is acquiring Potter Inc., another steel company, because it believes that the combined company will be able to cut costs and be more efficient. You have been given the following information on the two companies.

	<i>Hamlin Steel</i>	<i>Potter Steel</i>
Revenues (\$ millions)	\$ 1,000.00	\$ 500.00
After-tax Operating income (\$ million next year)	\$ 200.00	\$ 100.00
Expected growth rate	3%	3%
Return on Capital	12%	12%
Cost of capital	8%	8%

Assuming that the combined company can save \$100 million in costs (pre-tax) after the merger, and that the tax rate is 25%, estimate the value of the combined company after the merger.

Problem 7

Ridgeway Corp. is a mature manufacturing company that is expected to generate \$12 million in after-tax operating income next year and grow 3% a year in perpetuity. You have valued its operating assets correctly at \$100 million, give the company's cost of capital of 9%. An activist investor is planning an acquisition of the firm, on the assumption that he can cut the amount reinvested by half, while lowering the expected growth rate to 2.5% in perpetuity and the cost of capital to 7.5%. Estimate how much the value of the company will change, if he succeeds. (You can leave next year's operating income untouched)

Problem 8

You are considering acquiring paying \$50 million to acquire the rights to a video platform and have collected the following information.

- a. The platform currently has 3 million users, but makes no revenue from them.
 - b. If you spend \$500 million, you can convert this platform to a subscription-based business any time over the next five years (but not beyond). Based upon your current assessments, you estimate that your expected after-tax cash flow from a subscription-based business will be \$18 million next year, growing at 2% a year, in perpetuity. The 5-year riskfree rate is 2% and the cost of capital is 8%.
 - c. There is substantial uncertainty associated with the subscription-based business, and the standard deviation in the present value of the annual cash flows is 30%.
 - d. The platform costs \$4.5 million a year to run, in its current form, but that cost will disappear if the platform becomes subscription-based.
- Estimate the value you will gain or lose by investing in this platform.

Valuation: Final Exam

Answer all questions and show necessary work. Please be brief. This is an open books, open notes exam.

1. You have been asked to estimate the cost of equity for a Colossus Logistics, a company that operates in two businesses and two countries. You have been given the following information on **the values of the businesses**, broken down by geography and business (in millions of dollars)

	US	Mexico	Unlevered Beta
Shipbuilding	\$ 800.00	\$ 400.00	1.25
Trucking	\$ 200.00	\$ 100.00	0.9
Rf in local currency	3%	5%	
ERP	6%	9%	
Tax rate	25%	25%	

If the market capitalization of the company is \$900 million, and the company is fairly valued, estimate the cost of equity in US \$ for the company. (3 points)

2. You are valuing an unlevered company with revenues of \$1.5 billion in the most recent year, that is currently fully owned by its owner, but which expects to attract a private equity investor in year 2 and to go public in year 3.

	<i>Most recent year</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>After year 3</i>
Revenues (\$ millions)	\$1,500	Grows at 10% a year			3%
Operating margin (after tax)		5%	10%	15%	15%
Sales to Capital		4.00	4.00	4.00	
Correlation with market (of investors' portfolio)		0.25	0.50	1.00	

If the unlevered beta for the business that the company is 0.75, the riskfree rate is 3% and the equity risk premium is 6%, estimate the value of equity today. (You can assume that the company earns a ROIC = Cost of capital after year 3) (3 points)

3. You are trying to wrap up the valuation of a publicly traded company, and find yourself with lots of loose ends:
- The company is expected to generate \$240 million in expected FCFF next year, growing at 3% a year in perpetuity, and has a cost of equity of 10%, a pre-tax cost of debt of 6% and a cost of capital of 9%.
 - The company has a cash balance of \$400 million that it invested in US treasury bonds, when they were yielding 2%. Those bonds currently have ten years left to maturity and are yielding 4%, and have not been marked to market.
 - The company has cross (minority) holdings in other companies that have a book value of \$250 million; the price to book ratio for these holdings is 2.00.
 - The company has consolidated one subsidiary and the minority interest in that subsidiary is recorded at \$400 million; the price is equal to book value

- e. The company has no conventional debt, but it has contractual commitments of \$100 million/year for five years that you believe should be treated as debt.
Estimate the value of equity in this firm. (3 points)

4. You are valuing Carstell Inc., a mature restaurant company, that has been targeted in a class-action lawsuit, with the following characteristics:

Expected EBIT (1-t) next year (\$ millions)	Expected % growth forever	Return on capital	Cost of capital	Cost of debt (pre-tax)
\$180	3%	20%	8%	5%

The company has no debt, but if it does lose the lawsuit, it will have to pay out \$40 million/year in perpetuity. If the company has 137 million shares outstanding, trading at a fair price of \$20/share, what is the probability that the market is attaching that the company will lose the lawsuit. (4 points)

5. You are trying to price Revelli Inc, a multi-business company, and have been provided the following information on the businesses (in millions of dollars):

	<i>Expected in the next year</i>				<i>Current values</i>	
	Revenues	EBITDA	EBIT (1-t)	FCFF	BV Equity	Net Debt
Construction	\$2,000	\$200	\$100	\$40	\$750	\$500
Retail	\$1,500	\$120	\$40	\$30	\$180	\$20
Advertising	\$500	\$200	\$150	\$120	\$450	\$50

You have run one market-wide regression that you believe works across different sectors, and estimated the following:

$EV/Sales = 0.80 + 1.25 (EBITDA/Sales) - 0.90 (\text{Reinvestment Rate}) + 7.50 (\text{After-tax Return on Invested Capital})$

(Enter percentages as decimals, i.e., 35% as 0.35 in this regression)

Estimate the pricing of equity in this business. (3 points)

6. You are a consultant, specializing in marketing strategies, and you have been approached by Lonagra Inc., a consumer product company, that currently operate a low-margin business, with high sales turnover, and is considering a shift to a premium pricing strategy, with higher margin, albeit with lower sales turnover:

	Low Margin, High Sales (current)	High Margin, Lower Sales (proposed)
After-tax Operating Margin	8%	12%
Sales to Invested Capital	1.5	1.25
Expected growth rate in perpetuity	3%	3%
Invested Capital (\$ mil)	\$1000	\$1000

The firm currently trades at an EV/Sales of 1.20, which fairly reflects its current low margin strategy. Estimate the percentage change in enterprise value from moving to a higher margin strategy. (4 points)

7. Volpe Steel is an over-levered, publicly traded company that is being targeted by an activist, who is planning to reduce its debt load, while making itself more operationally efficient:

	<i>Status Quo</i>	<i>Restructured</i>
Book Equity (\$ million)	\$250.00	\$500.00
Book Net Debt (\$ million)	\$500.00	\$250.00
EBIT (1-t) next year (\$ millions)	\$60.00	\$75.00
Cost of capital	9%	8%
Expected growth	3%	3%

If there is a 40% chance that the activist will succeed in getting the firm to restructure, estimate the expected value of equity in Volpe Steel. (3 points)

8. Nodia Inc. is planning an acquisition of Wolfe Inc., with the intent of improving its margins and reducing its working capital needs after the merger. You have collected the information on the acquiring and target firms are below:

	<i>Acquiring</i>	<i>Target</i>
Revenues next year (in \$ millions)	\$1,500	\$1,000
After-tax operating margin (next year)	8%	6%
Net Cap Ex (next year, in \$ millions)	\$20	\$20
Change in Working capital (next year, in \$ millions)	\$20	\$10
Cost of capital	8%	8%
Growth rate in perpetuity	3%	3%

Once acquired, Nodia believes that it can improve Wolfe's after-tax margin to match its own and eliminate all working capital requirements for Wolfe, without affecting future growth. Estimate the value of synergy in this merger. (3 points)

9. Roadrunner Gaming is a start-up gaming platform that hopes to attract subscription-paying users to its platform. It has no subscribers right now, but expects to have 50 million subscribers, three years from now.

- a. The market is expected to attach a pricing of \$120 per subscriber in year 3, and you plan to discount that pricing back to today at a cost of equity of 25%. If you plan to buy 20% of the company today, how much would you pay for it? (1 point)
- b. You believe that there is a 50% standard deviation in the estimating pricing (subscriber count and pricing), but you have the option to buy the remaining 80% of the company at the end of year 3 at \$120/subscriber. Estimate the value of this option. Start by showing the key inputs ($r=3\%$) for valuing the option: (1 point)

$S =$ $t =$ $r = 3\%$

$K =$ $\sigma =$

Show the value of the option below: (2 points)

Final Exam: Valuation

Answer all questions and show necessary work. Please be brief. This is an open-book, open-notes exam.

1. You have been asked to estimate the cost of capital for Profumo Inc., a company that operates in the health care and senior center businesses, and have been provided the following information on the businesses.

	Value (\$ millions)	Unlevered Beta		Value (in \$ millions)
Health Care	\$500.00	0.60	Debt	\$400.00
Senior Centers	\$1,500.00	0.80	Equity	\$1,600.00

Profumo faces a marginal tax rate of 25% and is rated AA (with a default spread of 0.70%). If the riskfree rate is 4.50% and the equity risk premium is 5%, **estimate the cost of capital for the firm.** (3 points)

2. You are provided with the following information for Nagel Corporation (with all values in millions of dollars):

	Most recent year	Year 1	Year 2
EBITDA	\$120.00	\$150.00	\$160.00
EBIT	\$90.00	\$120.00	\$125.00
- Interest Expenses	\$10.00	\$20.00	\$25.00
Taxable Income	\$80.00	\$100.00	\$100.00
- Taxes	\$24.00	\$30.00	\$30.00
Net Income	\$56.00	\$70.00	\$70.00
Cap Ex	\$45.00	\$50.00	\$55.00
Working capital	\$80.00	\$100.00	\$90.00
Total Debt	\$150.00	\$175.00	\$160.00

Estimate the **expected free cash flows to equity each year, for the next two years** (years 1 & 2) (3 points)

3. Salazzo Marble is a flooring company and you are trying to estimate its expected cashflows and returns. The numbers for the most recent year and the expected values for revenues and margins for the next two years are provided below:

	Most recent year	1	2
Revenues (in \$ millions)	\$1,000.00	\$1,250.00	\$1,600.00
Operating Margin (pre-tax)	2.50%	5.00%	10.00%

If the effective tax rate is 20% and the invested capital at the end of the most recent year was \$500 million, **estimate the expected free cash flows for the firm for the next two years if you expect the after-tax return on capital at the end of year 2 to be 12%.** (You can assume that return on capital is computed by dividing the after-tax operating income during the year by the invested capital at the end of the year). (3 points)

4. You are trying to value Maglite Inc., a steel company with a 60% holding in Fertext Inc., a fertilizer firm, and you have the following information (with \$ values in millions):

	<i>Maglite (Consolidated)</i>	<i>Fertex</i>
EBIT (1-t)	\$125.00	\$25.00
Reinvestment	\$35.00	\$5.00
FCFF	\$90.00	\$20.00
Book Equity	\$800.00	\$50.00
Net Debt	\$200.00	\$50.00
Cost of capital	8.00%	10.00%

Estimate the value of equity in Maglite Inc., assuming that both firms are in stable growth, maintaining existing returns on capital and reinvestment rates. (3 points)

5. You are comparing Loblaw, a brand name cosmetics company, with Costless, a generic cosmetics company and have collected the following information:

	<i>Loblaw Inc.</i>	<i>Costless Inc</i>
After-tax Operating Margin	15.00%	7.50%
Sales to invested capital	1.60	2.00
Expected growth in perpetuity	3.00%	3.00%

If Loblaw trades at an EV/Sales ratio of 2.1875, **estimate the EV/Sales ratio for Cosgrove**. (Assume that these are both computed using expected sales next year, i.e., forward ratios.) (3 points)

6. You are pricing banks and have been given the following information on Sound Bank, a small regional bank, and on the average bank in the market:

	PBV	ROE	Cost of equity
Sound Bank	0.40	6.00%	8.00%
Average Bank	1.40	11.00%	9.00%

If all banks are mature (in stable growth) and the average bank is correctly priced, given its fundamentals, **evaluate how much Sound Bank is under or over-priced**. (3 points)

7. You are trying to value control in Hardaway Stores, a poorly run retail business that you think you can turn around, and have collected the following information:

	<i>Status Quo</i>	<i>Plans for change</i>
Revenues next year (\$ mil)	\$100	No change
Expected Operating margin (pre-tax)	6.00%	Cut costs by \$3 million (pre-tax)
Growth in perpetuity	3%	No change
Invested Capital (\$ mil)	\$60.00	No change
Cost of Equity (& Capital)	9%	
Debt ratio`	0%	Increase debt ratio to 20%, by borrowing at 5% (pre-tax cost of debt)

If the marginal tax rate is 25%, the riskfree rate is 4% and the equity risk premium is 5%, **estimate the value of control.** (4 points)

8. You are trying to value merger in a synergy, and have collected information on Stancil (the acquiring firm) and Merritt (the target firm):

	<i>Stancil</i>	<i>Merritt</i>
FCFF next year (\$ millions)	\$100.00	\$100.00
Debt to Capital ratio	20%	20%
Cost of equity	9.25%	9.25%
Cost of debt (pre-tax)	5.25%	5.25%
Expected growth rate forever	4.00%	4.00%

If the two firms merge, you believe that you can cut operating expenses by \$25 million, after taxes, without affecting expected growth, and that the combined firm will be able to double the debt to capital ratio to 40%, without altering the pre-tax cost of debt. **Estimate the value of synergy.** (The marginal tax rate is 25%, the riskfree rate is 4.50% and the equity risk premium is 5.00%). (4 points)

9. You are considering bidding for a rental property, with an expected after-tax rental income of \$1.2 million a year in perpetuity; the cost of capital is 10% for rental properties. That property comes with zoning rights that will allow you to double the size of the property, at the end of the fifth year; that expansion will cost you \$15 million, and that expansion will also double your annual rental income. If the riskfree rate is 4% and the expected rental income has an annualized standard deviation of 20%, **estimate the most you would pay for this property.** (If you believe that there is an option in here, please list the option inputs, before valuing the option.) (4 points)

d	$N(d)$	d	$N(d)$	d	$N(d)$
-3.00	0.0013	-1.00	0.1587	1.05	0.8531
-2.95	0.0016	-0.95	0.1711	1.10	0.8643
-2.90	0.0019	-0.90	0.1841	1.15	0.8749
-2.85	0.0022	-0.85	0.1977	1.20	0.8849
-2.80	0.0026	-0.80	0.2119	1.25	0.8944
-2.75	0.0030	-0.75	0.2266	1.30	0.9032
-2.70	0.0035	-0.70	0.2420	1.35	0.9115
-2.65	0.0040	-0.65	0.2578	1.40	0.9192
-2.60	0.0047	-0.60	0.2743	1.45	0.9265
-2.55	0.0054	-0.55	0.2912	1.50	0.9332
-2.50	0.0062	-0.50	0.3085	1.55	0.9394
-2.45	0.0071	-0.45	0.3264	1.60	0.9452
-2.40	0.0082	-0.40	0.3446	1.65	0.9505
-2.35	0.0094	-0.35	0.3632	1.70	0.9554
-2.30	0.0107	-0.30	0.3821	1.75	0.9599
-2.25	0.0122	-0.25	0.4013	1.80	0.9641
-2.20	0.0139	-0.20	0.4207	1.85	0.9678
-2.15	0.0158	-0.15	0.4404	1.90	0.9713
-2.10	0.0179	-0.10	0.4602	1.95	0.9744
-2.05	0.0202	-0.05	0.4801	2.00	0.9772
-2.00	0.0228	0.00	0.5000	2.05	0.9798
-1.95	0.0256	0.05	0.5199	2.10	0.9821
-1.90	0.0287	0.10	0.5398	2.15	0.9842
-1.85	0.0322	0.15	0.5596	2.20	0.9861
-1.80	0.0359	0.20	0.5793	2.25	0.9878
-1.75	0.0401	0.25	0.5987	2.30	0.9893
-1.70	0.0446	0.30	0.6179	2.35	0.9906
-1.65	0.0495	0.35	0.6368	2.40	0.9918
-1.60	0.0548	0.40	0.6554	2.45	0.9929
-1.55	0.0606	0.45	0.6736	2.50	0.9938
-1.50	0.0668	0.50	0.6915	2.55	0.9946
-1.45	0.0735	0.55	0.7088	2.60	0.9953
-1.40	0.0808	0.60	0.7257	2.65	0.9960
-1.35	0.0885	0.65	0.7422	2.70	0.9965
-1.30	0.0968	0.70	0.7580	2.75	0.9970
-1.25	0.1056	0.75	0.7734	2.80	0.9974
-1.20	0.1151	0.80	0.7881	2.85	0.9978
-1.15	0.1251	0.85	0.8023	2.90	0.9981
-1.10	0.1357	0.90	0.8159	2.95	0.9984
-1.05	0.1469	0.95	0.8289	3.00	0.9987
-1.00	0.1587	1.00	0.8413		