Foundations of Finance Final Corrected

Foundations of Finance B01.2311.60
Practice Final Questions

1. A T-bill has a face value of $100 and is selling for $98. If the T-bill matures in 3 months (¼ year), what is its bond equivalent yield?
   A  8.16%
   B  2.04%
   C  8.53%
   D  6.12%
   E  8.42%

2. Today is Feb 17, 2006 and the yield to maturity (expressed as an APR with semi-annual compounding) of a 10% Feb 2011 Treasury note with a par value of $100 is 8%. What is the price of this note today given that the Feb 2006 coupon has just been paid?
   A  100.00
   B  148.67
   C  107.99
   D  108.11
   E  92.42

3. Assuming true-model returns are identically independently distributed (i.i.d), which events violate semi-strong form market efficiency?
   I. Positive correlation between Monday’s return and the return over the preceding week.
   II. Abnormal positive returns on the day of announcement for companies that announce worker bonus plans.
   III. Abnormal positive returns in the fiscal year prior to the announcement of a worker bonus plan.
   A  I only.
   B  II only.
   C  III only.
   D  I and II only.
   E  I and III only.
4. On Jan 1, 2009, we set up a target-date-immunized portfolio of bonds to fund an obligation due on Jan 1, 2018. The portfolio consists of strips, coupon bonds that have 10-year maturities and bonds that have 6% coupon rates. It is now Jan 1, 2010. The yield curve is flat; it hasn’t changed since we set up the portfolio. To remain immunized we should

I. Do nothing  
II. Reallocate our investment in 10-year maturities from low-coupon to high-coupon bonds.  
III. Reallocate our investment in 10-year maturities from high-coupon to low-coupon bonds.  
IV. Reallocate our investment in 6% coupon bonds from short-maturity bonds to long-maturity bonds.  
V. Reallocate our investment in 6% coupon bonds from long-maturity bonds to short-maturity bonds.

A  I  
B  II and/or IV  
C  II and/or V  
D  III and/or IV  
E  III and/or V

5. The yield curve is flat at 12% EAR. An insurance company has an obligation to pay out $25,000 at the end of years two, four and six. It wishes to form an immunized portfolio from 3- and 8-year zero-coupon bonds. The portfolio weight (by value) in the 3-year zero should be:

A  80%  
B  86%  
C  88%  
D  92%  
E  96%

6. The yield on a 1-year discount bond expressed as an EAR is 10%. The spot price of Kryptonite is $10/gram. Storage costs per year are 3% of the spot price at the start of the year payable at the end of the year. What is the forward price for delivery of Kryptonite in 1 year?

A  $11.30  
B  $9.36  
C  $11.00  
D  $10.70  
E  $9.09
7. The forward price for delivery of 1 ounce of gold in 6 months is $405 and the spot price today is $350. Today’s price for a 6 month discount bond with a face value of $100 is $90 and today’s price for a 1 year discount bond with a face value of $100 is $85. Which (if any) of the following positions opened today is an arbitrage?

A. buy 1oz of gold forward for delivery in 6 months, sell 1 oz of gold, and buy 6 month discount bonds with a face value of $405
B. sell 1oz of gold forward for delivery in 6 months, sell 1 oz of gold, and buy 6 month discount bonds with a face value of $405
C. sell 1oz of gold forward for delivery in 6 months, buy 1 oz of gold, and sell 6 month discount bonds with a face value of $405
D. sell 1oz of gold forward for delivery in 6 months, buy 1 oz of gold, and sell 6 month discount bonds with a face value of $350
E. sell 1oz of gold forward for delivery in 6 months

8. Today is the 17th February 2006 and the prices of ½-year, 1-year and 1½-year discount bonds (all $100 face value) are $97, $89 and $88 respectively. These prices imply yields (expressed as APRs with semi-annual compounding) of 6.186%, 12.000% and 8.706% respectively. What is the price today of a 10% Feb 2007 Treasury note ($100 par)?

A. $97.90
B. $98.17
C. $103.64
D. $98.30
E. Not enough information is available

9. Today is the 17th February 2006 and the prices of ½-year, 1-year and 1½-year discount bonds (all $100 face value) are $97, $89 and $88 respectively. These prices imply yields (expressed as APRs with semi-annual compounding) of 6.186%, 12.000% and 8.706% respectively. What is the ½-year interest rate I can lock in today for the ½-year period starting in 1 year expressed as an APR with semiannual compounding?

A. 1.136%
B. 2.272%
C. 8.706%
D. 12.000%
E. Not enough information is available
10. Today is the 17th February 2006 and the prices of ½-year, 1-year and 1½-year discount bonds (all $100 face value) are $97, $89 and $88 respectively. These prices imply yields (expressed as APRs with semi-annual compounding) of 6.186%, 12.000% and 8.706% respectively. What return will I earn expressed as an APR with semiannual compounding if I buy ½-year discount bonds today, roll them into ½-year discount bonds in a half year from today and then roll those into ½-year discount bonds in one year from today?

A 8.950%
B 8.964%
C 8.706%
D 6.186%
E Not enough information is available

11. Suppose that the Japanese yen is at ¥105 per $ for immediate delivery, ¥103 per $ for delivery in one year, the yield (expressed as an EAR) on a 1-year $-denominated discount bond is 5% and on a 1-year ¥-denominated discount bond is 1%. An investor with $1M to invest should

A Keep the money under the bed.
B Convert the $ to ¥ and invest in 1-year ¥-denominated discount bonds.
C Keep the money in $ and invest in 1-year $-denominated discount bonds.
D Is indifferent between B and C.
E Can’t say without knowing whether the investor wants the investment proceeds in $ or ¥.

12. Suppose the ICAPM holds and investors care about $E[R_p(t)], \sigma[R_p(t)] \text{ and } \sigma[R_p(t), MI(\text{end } t)]$ where MI is a macroeconomic indicator and $R_p$ is portfolio return. Which of the following is true?

A Everyone holds some combination of the riskless asset and the mean-standard deviation tangency portfolio.
B Everyone holds some combination of the riskless asset and the market portfolio.
C Two assets with the same CAPM betas must have different expected returns.
D Two assets with different CAPM betas might have the same expected returns.
E None are true.
13. Let GIP(Jan) be the growth in industrial production in January and let R_M(Jan) be the January return on the market portfolio. Suppose each individual cares about \( \{E[R_p(Jan)], \sigma[R_p(Jan)], \sigma[R_p(Jan), GIP(Jan)]\} \) when forming his/her portfolio \( p \) for January. The following additional information is available:

<table>
<thead>
<tr>
<th>i</th>
<th>( \beta_{i,M} )</th>
<th>( \beta_{i,GIP} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>LZ</td>
<td>0.9</td>
<td>0.1</td>
</tr>
</tbody>
</table>

where \( \beta_{i,M} \) and \( \beta_{i,GIP} \) are regression coefficients from a multiple regression (time-series) of \( R_i(t) \) on the market portfolio return \( R_M(t) \) and the return on the hedging portfolio for GIP(Jan) \( R_{GIP}(t) \):

\[
R_i(t) - R_f = \varphi_{i,0} + \beta_{i,M} (R_M(t) - R_f) + \beta_{i,GIP} (R_{GIP}(t) - R_f) + e_i(t).
\]

and \( R_f \), the riskless rate, is 0.7%. Also know that \( E[R_M(Jan)] = 2\% \) and \( E[R_{GIP}(Jan)] = 1.7\% \). What is \( E[R_{LZ}(Jan)] \)?

A 1.97%  
B 1.87%  
C 2.67%  
D 2.04%  
E Not enough information.

14. When would an investor care about more than expected return on her portfolio and the standard deviation of return on her portfolio?

A Multiperiod investor and asset returns are predictable using past asset returns.  
B Any multiperiod investor.  
C Multiperiod investor whose human capital value is correlated with asset returns.  
D Both A and C  
E None of the above.

15. A European call on DV stock expires in a ½ year and has a strike price of $75. The current price of DV stock is $73. The price of a ½-year discount bond with a face value of $100 is $96. Which of the following statements is true?

A The call is worthless today since the current price of DV stock is less than the strike price.  
B All you can say is that the call price today is non-negative.  
C The call price today can be any strictly positive price  
D The call price today must be at least $1.  
E An individual would not be willing to hold the call today unless she was given a cash payment to do so.
16. Suppose you had invested in 200 units of a value stock index at the end of December 2004 at a price of $800. With the index at $900 at the end of June 2005, which of these investments on that date ensures a minimum portfolio value of $170000 at the end of 2005?

A  Buy 6-month puts on 200 units of the value index with a strike price of $850 per unit and a premium of $20 per unit.
B  Sell 6-month calls on 200 units of the value index with a strike price of $850 per unit and a premium of $155 per unit.
C  Buy 6-month calls on 200 units of the value index with a strike price of $850 per unit and a premium of $155 per unit.
D  Buy 6-month puts on 200 units of the value index with a strike price of $900 per unit and a premium of $48 per unit.
E  None of them.
Use the following information in questions 17, 18 and 19
The common stock of Mack is currently trading at $60 per share (down from $80 at the beginning of the year). Mack is currently “in play” as a takeover target and is not expected to pay any dividends for the next 6 months. You believe that if management is successful at repelling all offers, the stock price will fall significantly, but if they are unsuccessful, the stock price will rise. You want to profit from either outcome. The price of a 6-month discount bond with $100 face value is $95 and a 6-month put option with an exercise price of $60 is selling at $8.

17. A dealer offers you a 6-month European call option with an exercise price of $60. What is a fair price for this option?
A $11
B $5
C $8
D $0
E Not enough information.

18. Which of the following strategies would allow you to take advantage of your beliefs?
A In a 1:1:1 ratio, buy 6-month calls with a $60 strike, buy 6-month puts with a $60 strike and buy 6-month discount bonds with a $60 face value (so buy 1 call and buy 1 put for every bond bought).
B In a 2:1 ratio, buy 6-month puts with a $60 strike and buy the stock (so buy 2 calls for every share of stock bought).
C In a 2:1 ratio, sell 6-month calls with a $60 strike and buy the stock (so sell 2 puts for every share of stock bought).
D Both A and B
E Both A and C.

19. Two weeks later, Mack announces that it has successfully repelled all takeover bids. This announcement caused Mack’s stock price to decrease and the volatility of Mack’s stock return to decrease too. What would have happened to the price of European calls on Mack’s stock on the announcement date?
A All increased.
B All decreased.
C Some increased but some also decreased.
D Impossible to say anything.
E All unchanged.
20. If the (positive) yield to maturity on a discount bond is constant from one year to the next, the price of the discount bond over the next year will
A Increase
B Decrease
C Remain the same
D You cannot tell
E Sometimes increase and sometimes decrease depending on the shape of the yield curve

21. Suppose you buy a put option with a strike price of 100 for a premium of $10. Your maximum profit per share is
A $10
B $100
C $90
D $110
E Unlimited.

22. Suppose that the risk-free rate is $R_f = 3\%$, $E[R_{M}] = 11\%$ and the CAPM holds. According to Gordon's Growth Model, if a company has a current dividend of $D_0 = $20 per share, a constant expected dividend growth rate of $g = 6\%$, and $\beta = 1.25$, what is its stock price:
A the stock price is $285.71 per share
B the stock price is $302.86 per share
C the stock price is $342.14 per share
D the stock price is $197.21 per share
E not enough information to tell

23. If prices reflect all publicly available information, then
A the market is semi-strong efficient
B stock returns are unpredictable using public information
C one can earn abnormal returns consistently by doing advanced security analysis based on public information
D both A and B are true
E all of A, B and C are true

24. Assuming you hold a U.S. treasury coupon bond to maturity, its holding period return (expressed as an APR with semi-annual compounding) is equal to
A the coupon rate if you can and do reinvest at the coupon rate
B the coupon rate if you don’t reinvest
C the YTM if you can and do reinvest at the YTM
D the YTM if you can and do reinvest at the coupon rate
E none of the above
25. Assume a zero coupon bond has duration = 10 years and a 30 year bond has an 18% annual coupon and a duration = 10 years. Assume further that the yields on both bonds are the same and then change by an identical small amount. Then, the % price change of the 30 year will be approximately:

A. Equal to the % price change of the zero
B. Less than the % price change of the zero
C. Greater than the % price change of the zero
D. Can't tell
E. Depends on the yield curve
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Solutions to Practice Final Questions

1. A.
Holding period return = \((100-98)/98 = 2.04\%\)
Bond equivalent yield = APR with compounding period equal to maturity of the bill, here 0.25 years = \(4 \times 2.04\% = 8.16\%\)

2. D
Price(0) = \(5 \times (1-(1+0.04)^{-10})/0.04 + 100 \times (1+0.04)^{-10} = 108.11\)

3. A.
In an efficient market, a constant expected return implies returns uncorrelated so I violates. Abnormal returns on the day of the announcement and before announcement both consistent with semi-strong form market efficiency: neither allow you to develop a trading rule based on worker bonus plan announcements that earns a positive abnormal return.

4. C.
As of 1/1/09, the portfolio has a nine year duration and it includes a coupon bond. One year later, we need the portfolio to have an eight year duration, but the duration of the portfolio will not have fallen by a full year (because it includes coupon bonds). Therefore, we need to decrease the duration of the portfolio. Both II and V will do this. Could also calculate the durations to arrive at the same answer.

5. B.
<table>
<thead>
<tr>
<th>Year</th>
<th>CF</th>
<th>PV</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>25</td>
<td>19.93</td>
<td>41.1%</td>
</tr>
<tr>
<td>4</td>
<td>25</td>
<td>15.89</td>
<td>32.8%</td>
</tr>
<tr>
<td>6</td>
<td>25</td>
<td>12.67</td>
<td>26.1%</td>
</tr>
</tbody>
</table>

\(D_L = 0.411 \times 2 + 0.328 \times 4 + 0.261 \times 6 = 3.7\).

Let \(w_3\) be the fraction in 3-yr zero. Setting \(DA = DL\), obtain \(3.7 = 3 \times w_3 + (1-w_3)8\) and so \(w_3 = 0.86\)

6. A.
\(F_1(0) = 10 \times 1.1 + 10 \times 0.03 = 11.3\)

7. C.
\(F_6(0) = 405 > S(0)/d^{6/2}(0) = 350/0.9 = 389\). So sell future and buy synthetic. So sell 1oz of gold forward today for delivery in 6 months buy 1 oz of gold today sell 6 month discount bonds today with a face value of 405
8. D.
\[ P_{5\%Feb\ 07}(0) = 5 \times 0.97 + 105 \times 0.89 = 98.3 \]

9. B
\[ d_{1,1\frac{1}{2}}(0) = \frac{0.88}{0.89} = 0.988764 \]
\[ f_{1,1\frac{1}{2}}(0) = 2 \times \left( \frac{1}{0.988764} - 1 \right) = 2.27\% \]

10. E
Future yields on ½-year discount bonds are uncertain today.

11. C.
Investing in 1-year $-denominated discount bonds gives a \[ V_t = [1 + y_{\$1}(0)] = (1 + 0.05)M = $1.05M. \]
Converting the $ into ¥, investing in 1-year ¥-denominated discount bonds and converting back again at the forward rate gives
\[ \$ \left( \left[ \frac{1}{S_{\$\rightarrow¥}(0)} \right] \left[ 1 + y_{¥1}(0) \right] F_{1,¥}(0) \right) M = \$ (105M \times 1.01 \left[ \frac{1}{103} \right]) = $1.0296M. \]

12. D.
Assets don’t have to lie on the SML any more.

13. A.
Know ICAPM holds. So
\[ E[R_i(\text{Jan})] = R_t + \beta_{i,M} \lambda_M + \beta_{i,GIP} \lambda_{GIP} \]
where \[ \lambda_M = E[R_M(\text{Jan})] - R_t \] and \[ \lambda_{GIP} = E[R_{GIP}(\text{Jan})] - R_t. \]
So \[ E[R_{LZ}(\text{Jan})] = 0.7 + 0.9 \times (2 - 0.7) + 0.1 \times (1.7 - 0.7) = 1.97. \]

14. D.
Just because an investor is multiperiod, does not automatically mean she cares about more than expected return on her portfolio and the standard deviation of return on her portfolio so B is false.

15. D.
\[ C_{75,1\frac{1}{2}}(0) \geq \max \{ 0, 73 - 0.96 \times 75 \} = 1 \]

16. D.
For any index price at or below $900 at the end of 2005:
Portfolio Value = 200 (S(end 05) + $900 - S(end 05) - $48) = $170400
For any index price above $900 at the end of 2005:
Portfolio Value = 200 (S(end 05) - $48) > $170400

17. A.
\[ C_{X,T}(0) - P_{X,T}(0) = S(0) - X \, d_T(0) \] and so \( C_{X,T}(0) - 8 = 60 - 60 \times 0.95 = 3 \) which implies \( C_{X,T}(0) = 11 \).

18. D.
Both A and B generate the exact same v-shaped payoff as a function of Mack’s stock price at the expiration date.

19. B.
Black Scholes says that all European calls have prices that are positively related to both the price of the underlying and the volatility of the return on the underlying holding all else equal.

20. A.
Price of a discount bond with $1 of face value:
\[ d_T(0) = \frac{1}{[1 + \frac{y_T(0)}{2}]^{2T}} \]. For fixed \( y_T(0) \), as \( T \) decreases, \( d_T(0) \) increases.

21. C.
Maximum payoff is the strike price of $100 so the maximum profit is $100-$10=$90.

22. B.
SML: \( E[R] = 3 + 1.25 \times (11-3) = 13 \)
\[ P_0 = 20 \times \frac{1+0.06}{(0.13-0.06)} = 302.86 \]

23. A.
If expected returns are time-varying then returns can be predictable even though prices reflect all available information. Only A is true.

24. C.
Need to compound the cash flows forward at the YTM to get a value on the maturity date equal to the price compounded forward at the YTM

25. A.
Duration measures percentage price change for a small change in the yield to maturity. Both have the same durations and experience same small changes in their YTMs so the percentage price changes are the same.