Foundations of Finance,
Questions from past final exams
Prof. Joel Hasbrouck

(With answers in bold or starred: ***)**

1. ~~*ABC* has a β=1.2, we estimate the market risk premium as $Er_M - r_f$ = 9%; the current risk-free rate is r_f=6%. *ABC* has just paid its annual dividend of \$2 per share. This dividend is expected to grow at 4% per year indefinitely. Using the constant-growth valuation model, a share of *ABC* stock should sell for~~
   a. 16.25
   $Er_i=r_f+\beta_i(Er_M-r_f)$ = 6 + 1.2(9) = 16.8; $D_1 = D_0(1+g)$ = 2(1.04) = 2.08;
   $P_0 = D_1/(k-g)$ = 2.08/(0.168–0.04) = 17.93
   b. 17.24
   c. 17.10
   d. 18.25

2. ~~*ABC* has a □=1.5, we estimate the market risk premium as $Er_M - r_f$ = 9%; the current risk-free rate is r_f = 5%. *ABC* is expected to pay a dividend one year from now of \$3 per share. Using the constant-growth valuation model, what growth rate is required to justify a share price of \$30?~~
   a. 8.0%
   b. 10.0%
   c. 9.5%
   d. 8.5% **$Er_i = r_f + \beta_i(Er_M - r_f)$ = 5 + 1.5(9) = 18.5; 30 = 3/(0.185–g) $\Rightarrow$ (0.185 – g) = 0.10 $\Rightarrow$ g =** 8.5%

3. A 9.3% annual coupon bond with a 10-year maturity and a \$1,000 par value has a yield to maturity of 8%. Assuming that the yield curve is flat and doesn't shift, the holding period return you would achieve from buying the bond, holding it for one year and selling it is:
   a. 9.3%
   b. 8.0%
   You receive the y=8% in this case.
   Alternatively, P0: 10 N –93 PMT –1000 FV 8% I/YR$\Rightarrow$ P0 = 1,087.23
   P1: 9 N –93 PMT –1000 FV 8% I/YR $\Rightarrow$ P1 = 1,081.21
   HPR = 93/1,087.23 + (1,081.21 – 1,087.23)/1,087.23 = 8.55% – 0.55% = 8%
   c. More than 8%, since the bond is selling at a premium.
   d. Less than 8%, since the bond is selling at a discount.

4. The yields on zero coupon bonds are y_1=8%, y_2=8.2%, y_3=8.6%. According to the pure expectations hypothesis, what is the market's implicit expectation of the spot rate for a one-year investment starting at the beginning of the second year?
   a. 8.2%
   b. 8.4% **$1.08(1+f)=1.082^2 \Rightarrow f$=8.4%, which by the exp hypoth is equal to the expected short spot rate one year from now.**
   c. 0.2%
   d. Can't say without knowing the liquidity premium.

5. One year from now, an insurance company must make the first annual payment in a $5M per year perpetuity. The yield curve is flat at 8%. They are funding this obligation with a portfolio consisting of 5- and 20-year zero coupon bonds. To most closely achieve target-date immunization, the fraction of the portfolio that should be in the 5-year bonds is:
   - *a.* 0%
   - *b.* 43%

     D of the perpetuity is 1.08/.08 = 13.5 = 5x+(1-x)20 where x is the % in 5-year zero. ⇒ x=43%
   - *c.* 57%
   - *d.* Short as much of the 5-year bond as possible; put proceeds in 20-year bond

6. The yield curve is flat at 12% (yields at all maturities are equal to 12%). 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%

Year	**2**	**4**	**6**	
CF	**25**	**25**	**25**	
PV	**19.93**	**15.89**	**12.67**	**(Total=48.48)**
PV x t	**39.86**	**63.56**	**76.02**	**(Total=179.44)**

     D = 179.44/48.48 = 3.7 Let x be the fraction in 3-yr zero. Then 3.7 = 3x + (1–x)8 ⇒ x = 0.86
   - *c.* 88%
   - *d.* 92%

7. On Jan 1, 2004, with yields at all maturities equal to 8%, we set up a target-date-immunized portfolio of bonds to fund an obligation due on Jan 1, 2013. The portfolio consists of:

   (A) 10-year bonds with a 10% coupon. (duration=7.04 years), and

   (B) 30-year bonds with a 4% coupon (duration=11.92 years)

   It is now Jan 1, 2005. Yields of all bonds are still 8%. To remain immunized we might

   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.

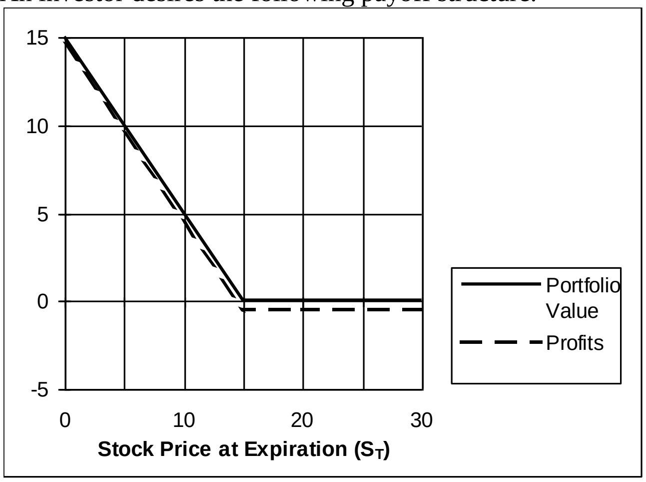
   V. Reallocate our investment in 6% coupon bonds from long-maturity bonds to short-maturity bonds.
   - *a.* I
   - *b.* II and/or IV
   - *c.* II and/or V

     As of 1/1/2004, the portfolio has a nine year duration and it includes a coupon bond. One year later, we will need an eight year duration, but the duration of the portfolio will not have fallen by a full year (because it includes the coupon bond). Therefore, we need to *decrease* the duration of the portfolio. Moving to high coupon bonds (II) and/or shortening the maturity (V) will do this.
   - *d.* III and/or IV
   - *e.* III and/or V

8. You purchased an Intel call option with X=80 for $5. If the stock is presently trading at 92, the intrinsic value of the call (per share) is
   - *a.* 12 ***** (The payoff from immediately exercising the option)**
   - *b.* 7
   - *c.* –7
   - *d.* –12

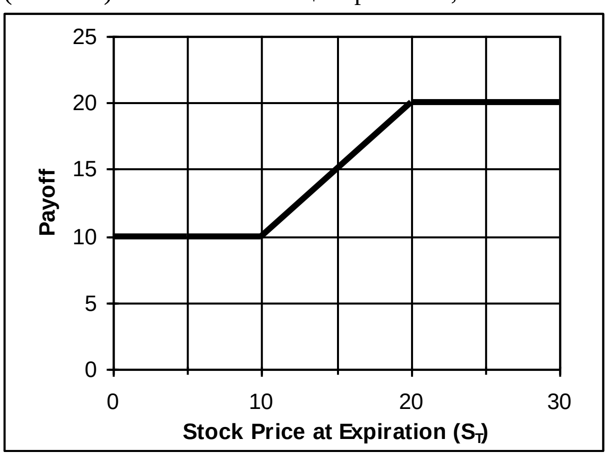
9. You purchased an Enron put option with an exercise price of 20 for 8. Enron stock is now trading at 0.50 and the market price of the put is 19.75. The time value of the option is:
   a. 19.75
   b. 0.25 ***** time value = premium – intrinsic value**
   c. 11.50
   d. 19.50 **(the intrinsic value)**

10. An investor desires the following payoff structure.



("Portfolio value"="Payoff") Assuming all options are European, this can be achieved by
   a. Long a put (X=15) ***
   b. Short the stock, short a call (X=15), buy bonds with total par value=15
   c. *a* and *b*
   d. None of the above

11. (Difficult) With the stock at $15 per share, an investor desires the following payoff structure.



Assuming all options are European, this can be achieved by
   a. Long the stock, long a put (X=10), short a call (X=20).
   b. Bond with par=10, long a call(X=10), short a call(X=20)
   c. Bond with par=20, long a put(X=10), short a put(X=20).
   d. *a* and *b*
   e. *b* and *c*
   f. *a* and *c*
   g. *a*, *b* and *c****

12. The stock of XYZ is currently at 15. At the end of one year, you believe that it will either be 12 or 16. The one-year interest rate is 8%. The price of a call option with an exercise price of 14 should be:
    a. 1.54
    b. 1.94 ***** S→12 or 16 ⇒ C→0 or 2 ⇒ -C+HS→12H or 16H-2 ⇒ H=1/2 ⇒ -C+HS→6 ⇒ -C+(1/2)15=PV(6,8%,1)=5.56 ⇒ C=1.94.**
    c. 2.00
    d. 5.56

13. With the stock at 72, a call option with X=70 has a delta (hedge ratio) of 0.7. A bank has just sold a customer a call option for 1,000 shares. To be hedged, the bank should be
    a. long 1,000 shares
    b. short 1,000 shares
    c. long 700 shares ***** The value of the call goes up by $0.70 for every $1 increase in the stock price. The bank is short the call, so when the stock price goes up by $1, the bank 'loses' $700 on this short position. Going long 700 shares offsets this.**
    d. short 700 shares

14. *XYZ* Corp is planning to float (issue, sell) long term bonds in 9-months. The treasurer can hedge interest rate uncertainty by setting up
    a. a long position in the Treasury bond futures contract
    b. a short position in the Treasury bond futures contract ***** If interest rates go up, the corporation will be paying a higher rate on the bonds that it issues. It will have a gain on its short postion in the futures contract. (Long-term) T-bonds are a better hedge that (short-term) T-bills.**
    c. a long position in the T-bill futures contract
    d. a short position in the T-bill futures contract

15. The S&P index is currently at 750. The one-year interest rate is 6% and the dividend yield on the S&P index is 2%. The settlement price on an index futures contract with a 1-year maturity is 770. An arbitrageur can
    a. Realize a profit at maturity of 10 by shorting the index, investing 750 and entering into the futures contract long. ***** By fwd-spot parity we should have F=750(1+6%-2%)=780 ⇒ F is undervalued relative to the spot by 10: sell the spot and go long the future.**
    b. Realize a profit at maturity of 10 by borrowing 750, buying the index, and entering into the futures contract short.
    c. Realize a profit at maturity of 40 by shorting the index, investing 750 and entering into the futures contract long.
    d. Realize a profit a maturity of 20 by buying the index and selling it at maturity (when forward-spot convergence drives the index to 770).
    e. Realize a profit at maturity of 40 by borrowing 750, buying the index, and entering into the futures contract short.

16. The principle of forward-spot parity
    a. is driven by arbitrage possibilities *******
    b. specifies the relation between the forward price and the expected future spot price
    c. is only applicable in contracts that settle "in kind"
    d. all of the above

17. A portfolio manager who is certain that Microsoft will outperform (have a higher return than) the market should be
    a. buy an at-the-money Microsoft call option
    b. buy Microsoft stock and short a stock index futures contract ***** This position locks in the difference between MSFT and index.**
    c. buy an at-the-money Microsoft call option and short an at-the-money put option on the index.
    d. *b* or *c*

18. For trading in listed futures contracts, who has to post margin?
    a. speculators and hedgers who are long the contract
    b. speculators and hedgers who are short the contract
    c. *a* and *b****
    d. Only speculators
    e. Only speculators who are short the contract.
    f. Only speculators who are long the contract.

19. The size of the S&P contract is $250 x the index. Over last week, the settlement prices were:

Monday	Tuesday	Wednesday
761	752	757

On Monday (as a speculator) we went short a contract at the settlement price. On Tuesday and Wednesday the daily resettlement cash flows for our position were:
    a. $2,250 inflow, $1,250 outflow *** The short position gains by 250 x (761-752) = 2,250 on Tuesday and loses by 250 x (757-752) on Wednesday.
    b. $2,250 outflow, $1,250 inflow.
    c. $0, $1,000 inflow.
    d. $0, $1,000 outflow
    e. Can't say without knowing whether our counterparty (the *long* side of our contract) was a hedger or a speculator.