SAMPLE FINAL QUESTIONS
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Adapted from problems originally composed by William L. Silber.

I. Questions

1. A bond's duration is higher when
   a. The coupon rate is higher
   b. The coupon rate is lower
   c. Yield to maturity is higher
   d. None of the above

2. If the one year spot rate is 4% and the forward rates for years 2, 3, 4, 5 are 5%, 7%, 8%, and 6%, respectively, then today's interest rate on a five-year bond should be
   a. 4%
   b. 5%
   c. 6%
   d. 7%
   e. 8%

3. According to the liquidity premium theory, an upward sloping yield implies
   a. Long-term rates are expected to rise
   b. Short-term rates are expected to rise
   c. Short-term rates are definitely not expected to decline
   d. You cannot tell

4. A coupon bond that pays interest of $100 annually has a par value of $1,000, matures in 5 years, and is selling today at a $72 discount from par value. The yield to maturity on this bond is
   a. 6.00%
   b. 8.33%
   c. 10.39%
   d. 12.00%
   e. 60.00%

5. Comparing a long put position with a short call position reveals the following common element:
   a. both positions have rights but no obligations
   b. both positions benefit from an increase in interest rates
   c. both positions will lose money if the price of the underlying remains unchanged
   d. both positions are potential sellers of the underlying asset

6. If corporate insiders who buy stock in their companies earn the same risk adjusted return as other investors, then:
   a. the market is not strong form efficient
   b. the market is strong form efficient
   c. they do not hold well diversified portfolios
   d. then the beta of their portfolios must be one
7. To lend money starting at the beginning of next year for one year at a currently known rate you can:
   a. sell short a two year security and buy a one year security
   b. buy a two year security and sell short a one year security
   c. buy a two year security
   d. sell short a two-year security

8. One thousand dollars invested in a zero coupon bond with five years to maturity will produce the same amount of money after five years as $1000 invested in a 10 percent coupon bond with five years to maturity:
   a. if they are both priced to yield 10 percent to maturity
   b. if the investor can and does reinvest the coupons at the yield to maturity
   c. if (a) and (b) hold
   d. under no circumstances

9. A one basis point decrease in yield on a bond with a duration of 10 years and a yield to maturity of 11 percent produces a change in the price of a $100 face value bond from $90.00 to:
   a. 90.05
   b. 89.92
   c. 90.11
   d. 90.08

10. The duration of a 5 year zero coupon bond is lower when the interest rate (ytm) is:
    a. higher
    b. lower
    c. unchanged
    d. none of the above

11. Suppose you buy an IBM straddle: a put with a strike of 60 and a call with a strike of 60, where each option has a premium of $3. Your straddle is an appropriate strategy if you believe that at expiration:
    a. IBM will be above 63
    b. IBM will be below 57
    c. IBM will be either above 63 or below 57
    d. IBM will be either above 66 or below 54

12. Which of the following five-year investments has the highest effective annual rate
    a. An 8 percent coupon annual pay bond selling at 97
    b. An 8 percent coupon semi-annual pay bond selling at par
    c. A zero coupon bond with $1000 face value selling at $665
    d. They all have the same EAR

13. 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
14. According to the expectations theory, an upward sloping yield curve implies
   a. Future short-term rates are expected to rise
   b. Long-term rates will be higher next year
   c. a and b
   d. You cannot tell

15. Which of the following is consistent with a random walk?
   a. Tomorrow's stock price level is independent of today's stock price level
   b. Tomorrow's returns are independent of today's returns
   c. News does not affect stock prices
   d. All of the above

16. Being long a call and short a put with the same exercise price and expiration is like:
   a. Long stock
   b. Short stock
   c. Long stock on margin
   d. Long a straddle

17. If the implied volatility of a call is greater than what you think is the actual volatility, you
    should:
   a. Buy the call
   b. Write the call
   c. Buy the put
   d. Sell the stock

18. In a swap agreement, the fixed rate payer/floating rate receiver has a position similar to:
   a. Long the five-year, short the 6-month
   b. Short the five-year, short the 6-month
   c. Long the five-year, long the 6-month
   d. Short the five-year, long the 6-month

19. If the expected one-year rate beginning next year is less than the forward rate, what should
    you think about doing today if you are going to receive 1000 dollars in one year?
   a. Nothing
   b. Buy the one year zero, short the two year zero
   c. Buy the two year zero, short the one year zero
   d. Buy a futures contract on the 30-year bond and sell in two years

20. According to the Black Scholes model, if \( N(d1) \) and \( N(d2) \) for a particular call option are both
    zero (for all intents and purposes), which of the following is most true
   a. The call is worthless
   b. The call will be exercised with certainty
   c. The call will not equal the minimum value
   d. The call will be less than the minimum value
21. Which of the following represents an arbitrage opportunity where you would do the following: buy the call, sell the put and sell the stock. S=110, X=100, r=0, t=1
   a. P =2, C=12
   b. P=5, C=15
   c. P=12, C=23
   d. P=5, C=12

22. Assume you bought an 8% coupon bearing bond with 4 years to maturity at par and then sold it at a premium before maturity. If you were able to reinvest the coupons at the YTM, then:
   a. Return = YTM
   b. Return is less than YTM
   c. Return is greater than YTM
   d. You cannot tell

23. The Liquidity Premium theory says (2 are right):
   a. The equilibrium 2 year rate = forward rate
   b. The equilibrium 2 year rate is greater than the average of the current and expected future short term rates
   c. The expected future short term rate = the forward rate
   d. The expected future short-term rate is less than the forward rate

24. The Liquidity Premium theory holds because investors are risk averse and because there are:
   a. More 2 year investors than one year investors
   b. More 2 year securities than “two-year” investors
   c. More one year securities than one year investors
   d. All of the above

25. Assume a zero coupon bond has duration = 10 years and a 30 year bond has an 18% coupon and a duration =10 years. Assume further that the yields on both bonds are the same and then change by the identical infinitesimally small amount. Then, the price volatility of the 30 year will be:
   a. Equal to the price volatility of the zero
   b. Less than the price volatility of the zero
   c. Greater than the price volatility of the zero
   d. Can’t tell

26. The ability to replicate an option with a position in the underlying stock depends crucially on:
   a. dynamically adjusting the hedge ratio on a continuous basis
   b. correctly predicting tomorrow's stock price
   c. properly estimating the stock’s beta
   d. all of the above

27. Bonds with call provisions are
   a. more desirable than noncallable and generally higher priced
   b. less desirable than non callable and generally lower priced
   c. more desirable than non callable and generally higher priced
   d. are not worth buying
28. A party will enter a Swap agreement to:
   a. Reduce risk exposure on its balance sheet
   b. Speculate
   c. Immunization against interest rate changes
   d. Not enough information given to determine

29. An upcoming event suggests that there will be significant movement in the share price, but you’re not sure in which direction. Which position would you choose?
   a. Long a call
   b. Short a call
   c. Long a straddle
   d. Long a protective put

30. For a Treasury Bill, the BYE \[(F - P)/P)/t\text{ where }t = x/365\]
   a. assumes compounding within a year
   b. assumes simple interest
   c. takes the periodic rate and multiplies by the number of periods
   d. b and c are true

31. Assuming you hold an annual pay coupon bearing bond to maturity, its realized compound return is equal to:
   a. the YTM if you can and do reinvest at a fixed rate
   b. the EAR
   c. the YTM if you can and do reinvest at the YTM
   d. none of the above

32. In a downward sloping yield curve environment,
   a. the liquidity premium cannot exist
   b. according to the expectations approach, long-term rates are no longer an average of current and expected future rates
   c. expected future short term rates cannot be greater than the current short term rate
   d. a and b are correct

33. According to the Expectations Approach to the term structure
   a. the forward rate is not a good estimate of the expected future 1-year rate
   b. investors are risk averse
   c. when the term structure is in equilibrium, the forward rate is equal to the expected rate
   d. none of the above

34. According to the liquidity premium approach to the term structure
   a. The investors’ subjective degree of risk aversion is embedded in the 2-year rate
   b. the equilibrium 2-year rate > an average of 1-year and expected future 1-year rate
   c. the forward rate > the expected rate due to a risk premium
   d. all of the above

35. The buyer of a put and seller of a call
   a. both are potential sellers of the underlying asset
   b. both have rights and not obligations
   c. both profit if the price of the underlying asset falls
   d. a and c are correct
36. A protective put
   a. combines a long put with long stock
   b. creates a long call
   c. profits when the underlying asset's stock price increases
   d. has downside protection
   e. all of the above

37. Long a straddle
   a. is a bet on volatility
   b. profits when nothing happens
   c. profits with wide swings in either direction of the price of the underlying asset
   d. is the same as a protective put
   e. a and c are correct

38. The price volatility of a bond during a year, in general, depends upon
   a. the duration of the bond
   b. the volatility of interest rates
   c. the volatility of expected inflation
   d. all of the above

39. Which of the following statements is false:
   a. When current yield is greater than yield to maturity, the bond is selling at a premium
   b. The price of a semi-annual or an annual coupon paying bond will be the same if their
      coupon rate is the same as yield to maturity regardless of differences in maturity
   c. The concept of yield to maturity suffers from the reinvestment assumption for both semi-
      annual and annual coupon paying bonds
   d. If I invest $100 in a 10% coupon, 2-year bond at par, I will certainly get $121 at the end
      of the two years

40. An executive is given two choices, either receive nontransferable one-year European call
    options on 1000 shares with an exercise price of 100 or get an extra $1,000 in bonus at the
    end of the year for every point that the company’s stock exceeds 100 dollars. Which bonus
    plan should she choose to provide her with the largest dollar payout?
    a. Take the options
    b. Take the money
    c. They are the same

41. If the stock price falls and the call price rises, then what has happened to the call option’s
    implied volatility (assuming nothing else has changed)?
    a. Up
    b. Down
    c. Same
    d. Can’t tell

42. Two-year zero coupon securities have greater price volatility than one-year zero-coupon
    securities over an identical one month period:
    a. under all circumstances
    b. when investors are risk averse
    c. only for parallel shifts in a flat yield curve
    d. as long as the law of one price holds
43. The price (per $100 face value) of a 7% semi-annual pay bond with exactly 2-1/2 years to maturity and a yield to maturity of 8.75% is:
   a. 93.4381
   b. 96.9111
   c. 96.1454
   d. none of the above

44. Suppose the current price of XYZ stock is $50. You buy a call on XYZ with a strike price of 55 for $6 and buy a put on XYZ with a strike price of 45 for $5, both options to expire in one month (this position is known as a strangle). Based on this information alone, your position will make money on expiration if XYZ’s stock price is above $____ or below $____.

45. Suppose you buy a ten year $1000 face value zero coupon bond whose yield to maturity (annual compounding) is 7 percent. You sell the bond exactly two years later, when the yield to maturity is 10 percent. What is the price change per $1000 bond?
   a. +$73.67
   b. +$31.84
   c. -$41.84
   d. -$73.67

46. Which of the following statements about a one-year short sale of U.S. one-year Government bonds is true:
   a. It is impossible to sell short U.S. Government bonds for more than six months.
   b. Even combined with other securities, the short sale makes no sense unless you expect to buy back the Government bonds after the price declines.
   c. This transaction is functionally equivalent to borrowing money for one year.
   d. This transaction will be profitable only if yields fall in the future.

47. If the (positive) yield to maturity on a zero coupon bond is constant from one year to the next, the price of the zero coupon bond over the next year will
   a. Increase
   b. Decrease
   c. Remain the same
   d. You cannot tell
II. Answers

1. B

2. C
   XXX: The way I tried to solve this is by setting up the following equation:
   
   \[(1 + r)^5 = (1.04)(1.05^2)(1.07^3)(1.08^4)(1.06^5)\]
   
   Obviously this approach is incorrect since I'm not getting the correct answer. Can you help me solve this?
   [JH] You make a 5-year bond by rolling over one-year investments:
   
   \[(1 + r) = 1.04 \times 1.05 \times 1.06 \times 1.07 \times 1.08 \Rightarrow r = 5.99\% \approx 6\%\]

3. D: The liquidity premium theory is an extension of the expectations hypothesis (not an alternative theory). If we just had the expectations theory operating, an upward sloping yield curve would imply that short-term rates are expected to rise (a). But once we allow for a liquidity premium, there is a possibility that short-term rates are expected to remain the same (or even fall), i.e., that the higher yield on longer term bonds is due to the liquidity premium.

4. D

5. D

6. B

7. B: "Selling short" an interest-bearing security is equivalent to borrowing: the short sale proceeds equal the amount originally lent. So "buy a two year security and sell short a one year security" is equivalent to "buy a two year security, but finance it for the first year with a loan." The only time you're net investing is in the second year.

8. C: Since we're aiming to get "the same amount of money" at maturity, the relevant return measure is the RCR. For a zero coupon bond, RCR=ytm (always). For a coupon bond, RCR=ytm only when the reinvestment rate=ytm. So to get the same amount of money, the ytm's on both bonds have to be the same (a) AND the reinvestment rate has to equal the ytm (b)

9. D: \(\%\Delta P = \Delta P/P = -10/(1.11) \times (-0.01\%) = 0.0909\%.\) The price change is expressed as a percent of current price (not par). So for example, if we have a 1% increase in 90, the new price would be 90.9. An increase of 0.0909% in 90 is 1.000909 x 90 = 90.08181.

10. D

11. D

12. A: The time horizon here is five years for all securities.
    For (a) \(-97=PV\ 5=n\ 8=pmt\ 100=FV \Rightarrow i=8.77\%\) This is an annually-compounded rate, so it is the EAR.
    For (b) \(-100=PV\ 10=n\ 4=pmt\ 100=FV \Rightarrow i=4\%\ \text{per six month period, or} 8\% \text{ (APR compounded semi-annually).} (1+0.04)^2 = (1+\text{EAR}) \Rightarrow \text{EAR} = 8.16\%
    For (c) \(-665=PV\ 1,000=FV\ 5=n \Rightarrow i=8.50\%.\) So (a) is the highest.
If I am receiving a floating rate, that is like owning a short-term debt instrument, because the floating rate gets reset based on the short-term rate. If I am paying a fixed interest rate, that is like borrowing using a long-term bond, i.e., shorting a long-term bond.

OR

Being long (owning) a bond puts you in the position of an investor (receiving interest); being short a bond puts you in the position of a borrower (paying interest). So “paying fixed” is similar to borrowing (for the life of the swap) at a fixed interest rate, as if you’d negotiated a long-term fixed-rate debt. “Receiving floating” is similar to investing (for the life of the swap) in a rolling-over of short-term bonds (whose interest rate will vary). “Short the five-year” is roughly the same as “borrowing fixed”; “long the 6-month” is roughly the same as “investing with a floating rate”.

XXX: I understand that buying a 2 yr 0 gets you a known IR, but why would we short a 1 yr 0? [JH] Since we’re going to be receiving the money in one year, we need an investment that starts in 1 yr. [FC] Since the forward will pay you more than the expected rate, you prefer to invest your money in the forward. However, simply buying the forward is not one of the answer choices here, so we must create it synthetically. To do so, we buy a 2 year bond and finance it by selling a 1 year bond. Logically, consider that the 2 year bond is identical to a 1 year bond plus a 1 year forward starting when the 1 yr bond matures. We want the forward, but don’t want the 1 year bond, so we short a 1 year bond in addition to buying the 2 year, and the synthesized position that remains is simply the forward.

To start, think put-call parity: \( S + P = B + C \Rightarrow C - P - S = -B \).

We’re given that \( S=110 \), \( B \) (in all put-call parity problems) is a bond with \( \text{par} = X = 100 \). Since the interest rate is \( r=0 \), the value of the bond today is 100. So put call parity implies:

\[ C - P - 110 = -100 \]

With prices as given in (a) \( 12 - 2 - 110 = -100 \), so put-call parity holds exactly.

With (b) \( 15 - 5 - 110 = -100 \), and (again) put-call parity holds exactly.

With (c) \( 23 - 12 - 110 = -99 > -100 \). So put-call parity is violated. But in the wrong direction. If we buy the call, write the put and short the stock we’ll get an inflow of \$99\.; if we simply short the bond (i.e., borrow 100), we’ll get an inflow of 100. An inflow of 100 is better than an inflow of 99.

With (d) \( 12 - 5 - 110 = -103 < -100 \). Again, put-call parity is violated, but in the right direction.
Alternate explanation:
No matter what the stock price is at maturity, we'll have an outflow of 100, i.e., the payoff is -100. This payoff is determined by the composition of the portfolio (call-put-stock), which is fixed. (You might verify this by working out what the payoff would be for two values of ST, say 50 and 150.)

Today, our cash flow is
-C (to buy the call)
+P (when we sell the put)
+S (the proceeds of the short sale)

Since the cash flow at maturity is the same for all choices, we want to identify the one that will give us the biggest inflow today:

a. -12+2+110=100 (i.e., if we do this, we'll get 100 today and pay back 100 at maturity. Since r=0, this is a “fair” outcome.
b. -15+5+110=100 Nope.
c. -23+12+110=99 If we do this, we're borrowing 99 today and paying back 100 at maturity. Since r=0, this is a bad outcome.
d. -12+5+110=103<-100 Yes! We're borrowing 103 today and paying back 100 at maturity (a good deal).

22. C

23. B, D
(a) is clearly wrong: a spot rate is conceptually a different thing that the forward rate. (b) might be right (if the liquidity premium is positive); (d) might be right (if the liquidity premium is negative). You could also make the case that (c) might be right (if the liquidity premium is zero).

24. B

25. A
XXX: Why? Can you explain the concept of price volatility?
[JH] Price volatility is (in this context) how much a bond will move in response to a yield change. Duration measures this sensitivity, so since the bonds have the same duration, they'll have the same price volatility.

26. A

27. B

28. D

29. C

30. D

31. C
32. C

33. C

34. A. The liquidity premium is the discrepancy between the forward rate and the expected future spot rate. It arises from investors' risk aversion. It is not generally clear, however, which risk dominates their thinking: the risk that they'll need money before a long-term bond matures; or the risk that when rolling over short-term investments the future short-term rate might be low. The traditional thinking is that the first of these risks is the most important one, in which case investors require a positive premium for committing to a long-term bond. In this traditional view, B and C (and therefore D) are also correct. The current view, though, is that the liquidity premium can have either sign, in which case B and C are not necessarily true.

35. D

36. E

37. E

38. D

39. D

XXX: Can you give me an example (or point to an example in the book) of answer B to help me understand B's concept? ("The price of a semi-annual or an annual coupon paying bond will be the same if their coupon rate is the same as yield to maturity regardless of differences in maturity")

[JH] The wording in this question is a little tricky. For ANY bond, if the yield to maturity = coupon rate, then the bond price = par.*** So (assuming that the bonds have the same par value), once we've said that their ytms=coupon rates, they are both priced at (equal) par.*** The book illustrates this on p. 454 (figure 14.3); In the first class bond handout, we computed the present value of a 9% coupon bond. When we discounted the bond cash flows at 9%, the present value was equal to the par value.

Here's an analysis of (a): Recall that if y doesn't change over the holding period, then the holding period return = y = current yield + capital gains. If y>current yield, then the capital gains must be negative to make the equation balance. This means that the bond is selling above par, i.e., at a premium, and as we approach maturity the price declines to par.

40. C

41. A

42. C

[FC] The thinking behind this is based on one of the ways we define duration: "bond price sensitivity to small parallel shifts in a flat yield curve." First thought may be that answer (a) is correct since the 2 yr has a longer duration, but consider an example where 1 year rates move while 2 year rates remain unchanged - the shorter term bond actually changes price while the longer term bond does not. Accordingly, to define duration as bond price sensitivity, we must first qualify that with the assumption that the yield curve is flat and makes parallel shifts.

43. C
44. 66, 34
45. C
46. C
47. A