Q1
A bond with face value of $100 matures in 8 month and is currently selling for $102. It pays semiannual coupon of $3. Two-month and eight-month zero rates are 5% and 5.5%. Find the par yield.

Q2:
You have the following information about 3 different risk-free bonds. All bonds have $100 face value and all coupons are paid semiannually (with the last coupon payment at the time of maturity).

B1: has 3 month till maturity, annual coupon rate 5%, current price $100
B2: has 6 month till maturity, annual coupon rate 6%, current price $99
B3: has 9 month till maturity, annual coupon rate 5.5%, current price $100.5

Find zero rates for 3, 6 and 9 month.

Q3:
Find forward rate between 3 month from now and 15 month from now if 3-month zero rate is 5% and 15-month zero rate is 5.5%

Q4:
Find the value of a swap in which you pay 6% per annum (compounded semiannually) and receive floating interest semiannually on a principal amount of $1,000,000. There are 10 month left till the end of the swap agreement. The next payment that you will receive (4 month from now) is equal to $35,000. Zero rates (continuously compounded) for 4 months and 10 months are 7% and 7.5% respectively.

Q5:
It is May 1. The quoted price of a bond with an Actual/Actual (in period) day count and 12% per annum coupon in the United States is 105. It has a face value of 100 and pays coupons on April 1 and October 1. What is the cash price?
A) 106.00
B) 106.02
C) 105.98
D) 106.04

Q6) The most recent settlement bond futures price is 103.5. Which of the following four bonds is cheapest to deliver?
A) Quoted bond price = 110; conversion factor = 1.0400
B) Quoted bond price = 160; conversion factor = 1.5200
C) Quoted bond price = 131; conversion factor = 1.2500
D) Quoted bond price = 143; conversion factor = 1.3500

Q7) The modified duration of a bond portfolio worth $1 million is 5 years. By approximately how much does the value of the portfolio change if all yields increase by 5 basis points?
A) Increase of $2,500
B) Decrease of $2,500
C) Increase of $25,000
D) Decrease of $25,000

Q8) The time-to-maturity of a Eurodollars futures contract is 4 years, and the time-to-maturity of the rate underlying the futures contract is 4.25 years. The standard deviation of the change in the short term interest rate, $\sigma = 0.011$. What is the difference between the futures and the forward interest rate?
A) 0.105%
B) 0.103%
C) 0.098%
D) 0.093%

Q9) A company can invest funds for five years at LIBOR minus 30 basis points. The five-year swap rate is 3%. What fixed rate of interest can the company earn by using the swap?
A) 2.4%
B) 2.7%
C) 3.0%
D) 3.3%

Q10) Which of the following is a way of valuing interest rate swaps where LIBOR is exchanged for a fixed rate of interest?
A) Assume that floating payments will equal forward LIBOR rates and discount net cash flows at the risk-free rate
B) Assume that floating payments will equal forward OIS rates and discount net cash flows at the risk-free rate
C) Assume that floating payments will equal forward LIBOR rates and discount net cash flows at the swap rate
D) Assume that floating payments will equal forward OIS rates and discount net cash flows at the swap rate

Q11) Which of the following is a use of a currency swap?
A) To exchange an investment in one currency for an investment in another currency
B) To exchange borrowing in one currency for borrowings in another currency
C) To take advantage situations where the tax rates in two countries are different
D) All of the above

Q12) Since the 2008 credit crisis
A) LIBOR has replaced OIS as the discount rate for non-collateralized swaps
B) OIS has replaced LIBOR as the discount rate for non-collateralized swaps
C) LIBOR has replaced OIS as the discount rate for collateralized swaps
D) OIS has replaced LIBOR as the discount rate for collateralized swaps

Q13) Which of the following is a typical bid-offer spread on the swap rate for a plain vanilla interest rate swap?
A) 3 basis points
B) 8 basis points
C) 13 basis points
D) 18 basis points

Q14) Consider a put option and a call option with the same strike price and time to maturity. Which of the following is true?
A) It is possible for both options to be in the money
B) It is possible for both options to be out of the money
C) One of the options must be in the money
D) One of the options must be either in the money or at the money

Q15) The price of a stock is $67. A trader sells 5 put option contracts on the stock with a strike price of $70 when the option price is $4. The options are exercised when the stock price is $69. What is the trader's net profit or loss?
A) Loss of $1,500
B) Loss of $500
C) Gain of $1,500
D) Loss of $1,000

Q16) Which of the following describes a long position in an option?

A) A position where there is more than one year to maturity
B) A position where there is more than five years to maturity
C) A position where an option has been purchased
D) A position that has been held for a long time

Q17) An investor has exchange-traded put options to sell 100 shares for $20. There is a $1 cash dividend. Which of the following is then the position of the investor?
A) The investor has put options to sell 100 shares for $20
B) The investor has put options to sell 100 shares for $19
C) The investor has put options to sell 105 shares for $19
D) The investor has put options to sell 105 shares for $19.05

Q18) An interest rate swap has three years of remaining life. Payments are exchanged annually. Interest at 3% is paid and 12-month LIBOR is received. A exchange of payments has just taken place. The one-year, two-year and three-year LIBOR/swap zero rates are 2%, 3% and 4%. All rates an annually compounded. What is the value of the swap as a percentage of the principal when LIBOR discounting is used?
A) 0.00
B) 2.66
C) 2.06
D) 1.06

Answers:

Q1
A bond with face value of $100 matures in 8 month and is currently selling for $102. It pays semiannual coupon of $3. Two-month and eight-month zero rates are 5% and 5.5%. Find the par yield.

Answer: 3.6818%
Solution:
c/2*exp(-0.05*2/12)+(100+c/2)*exp(-0.055*8/12)=100
Thus, c=2*(100-100*exp(-0.055*8/12))/(exp(-0.05*2/12)+exp(-0.055*8/12))=3.6818
(0.5 for formula, 0.5 for the answer)

Q2:
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B3: has 9 month till maturity, annual coupon rate 5.5%, current price $100.5

Find zero rates for 3, 6 and 9 month.

Solution:
3m: 102.5*exp(-0.25r)=100. Thus, r=ln(102.5/100)/0.25=9.88% (0.5 points)
6m: r=ln(103/99)/0.5=7.92% (0.5 points)
9m: 2.75*exp(-0.25*0.09877)+102.75*exp(-0.75r)=100.5
Thus, r=-ln((100.5-2.75*exp(-0.25*0.09877))/102.75)/0.75=6.56%
(1 point)

Q3:
Find forward rate between 3 month from now and 15 month from now if 3-month zero rate is 5% and 15-month zero rate is 5.5%

Solution: (15/12*5.5-3/12*5)/(15/12-3/12)=5.625%

Q4:
Find the value of a swap in which you pay 6% per annum (compounded semiannually) and receive floating interest semiannually on a principal amount of $1,000,000. There are 10 month left till the end of the swap agreement. The next payment that you will receive

(4 month from now) is equal to $35,000. Zero rates (continuously compounded) for 4 months and 10 months are 7% and 7.5% respectively.

Solution:
We will use bond-valuation approach.
Floating rate payments: PV=1035000*exp(-0.07*4/12)=$1,011,129.57
Fixed rate payments:
PV=30000*exp(-0.07*4/12)+1030000*exp(-0.075*10/12)=$996,903.56
Thus, the value of your swap is $1,011,128.57-996,903.56=$14.226.01

Q5:Answer: C

Q6) Answer: C

Q7) Answer: B

Q8) Answer: B

Q9) Answer: B

Q10) Answer: A

Q11) Answer: D

Q12) Answer: D

Q13) Answer: A

Q14) Answer: D

Q15) Answer: C

Q16) Answer: C

Q17) Answer: A

Q18) Answer: B