Session 9: Post Class tests

1. Which of the following is a requirement for a security to be treated as an option?
    a. It has to derive its value from another security or asset
    b. You should have the right to buy or sell the underlying security at a specified price.
    c. The right should expire at a specified point in time.
    d. All of the above
    e. None of the above
2. XYZ company has shares trading at $45/share. You have decided to invest in listed options on the company, with three months to expiration, and have bought a call option with a strike price of $50 and sold a call option with a strike price of $60, both expiring in three months. If the stock is trading at $65 at the end of three months, what is your gross cash payoff from this position?
    a. - $10
    b. + $10
    c. + $20
    d. $ $25
    e. None of the above
3. Options can be structured to be exercised only at maturity (European) or any time until maturity (American). Assume that you are comparing two options on the same stock, with the same characteristics (strike price & maturity), but one is European and the other is American. Which of the following statements would you agree with the most?
    a. The two options should trade at the same price
    b. The American option should always trade at a higher price
    c. The European option should always trade at a higher price
    d. The American option should trade at the same or a higher price than the European option.
    e. The European option should trade at the same or a higher price than the American option.
4. The Binomial model is often used to illustrate the replication process that underlies option pricing. Assume that you have a stock that is currently trading at $50, and that it can jump to $75 or $25 in the next period. If you have an option with a strike price of $40 and the riskfree rate is 5%, <u>how much would you need to borrow</u> to create the replicating position?
    a. $15.00
    b. $16.67
    c. $18.25
    d. $33.33
    e. None of the above
5. You are given the task of valuing a 3-month call option on a stock, currently trading at $45/share. The exercise price is $50 and based upon the variance in the stock price, you computed d1=-0.39 and d2 =-0.59. If the risk free rate is 3%, what is the value of the option in the Black-Scholes model?

a. $0
b. $1.00
c. $1.90
d. $ 5.00
e. None of the above

6. You are valuing a 5-year call option on a stock, currently trading at $45/share, with a dividend yield of 1.50%. The exercise price is $50, the standard deviation in the stock price is 40%, and the risk free rate is 3%. What is the value of the option in the Black-Scholes model?
    a. $0
    b. $8.50
    c. $14.00
    d. $ 16.20
    e. None of the above

Session 9: Post class test solutions

1. **d. All of the above.** You need all the conditions to hold for optionality.
2. **b. $10.** If the stock price goes to $65, the cash flow on the bought call will be +$15 (65-50) and cash flow on the sold call will be -$5 ($60 - $65). The total cash flow will be +$10.
3. **d. The American option should trade at the same or a higher price than the European option.** The American option provides everything that a European option does, with the added benefit of being able to exercise early. With many listed and traded options, that benefit is worth nothing, since early exercise is sub-optimal (you can sell the option for a higher price). However, if there is the possibility of early exercise exists, the American option should trade at a higher price.
4. **c. $16.67.** To set up the replicating portfolio, you need to solve the simultaneous equations. Since the call with a strike price of $40 will have a cash flow of $35, if the stock goes to $75, and a cash flow of zero, if the stock goes to $25. 75 D – 1.05 B = 35 and 35 D -1.05 B =0, Solving for D = 0.70 and B = $16.67.
5. **c. $1.90**. d1=-0.39-> N(d1) = 0.3485, d2=-0.59 -> N(d2) = 0.2778. Value of call = 45 (.3485) – 50 $\exp^{-(.03)(5)}$ (.2778) = $1.90
6. **c.** $**14.00**. d1=0.41-> N(d1) = 0.6603, d2=-0.48-> N(d2) = 0.3152. Value of call = 45 $\exp^{-(.015)(5)}$ (.6603) – 50 $\exp^{-(.05)(5)}$ (.3152) = $14.00