

Old Exam Questions
Option Pricing

READ FIRST: The following questions are reproduced from my previous exams. Exam formats have differed over time, so you may notice some differences in formatting or question style. The intent is that these questions will help you to practice, but it is **NOT** intended to replace your own study habits.

1. You are attempting to calculate the price of a call option using the binomial model. The underlying stock price is currently \$40. In one year, it will either increase to \$62 or decrease to \$22. You have already calculated that this will result in the call being worth either \$20 if the stock increases in value or \$0 if the stock decreases in value. If the risk-free rate is 10%, what would you estimate the price of the call to be?
 - A. \$5
 - B. \$10
 - C. \$15
 - D. \$18
 - E. \$22
 - F. A different value

2. If the firm's dividend payout ratio increases, then the price of the put option will _____ and the price of the call option will _____.
 - A. Decrease; Decrease
 - B. Decrease; Increase
 - C. Increase; Decrease
 - D. Increase; Increase

3. Which of the inputs for the Black-Scholes option pricing model are we least likely to be able to observe accurately?
 - A. Exercise price
 - B. Expiration date
 - C. Stock price
 - D. Volatility
 - E. Time

4. You are taking notes as your professor works through the price of a call option using the Black-Scholes model. When you're reviewing your notes after class, you think he made a mistake. Portions of his work are shown here:

$$S = 20, X = 25, \sigma = .5, r_f = 2\%, T = .25$$

$$d_1 = -0.74757, \quad d_2 = -0.99757$$

$$N(d_1) = 0.227359, \quad N(d_2) = 0.24635$$

$$PV(X) = 25 \times e^{-.02 \times .25} = 24.38$$

$$C = 20 \times .227359 - 24.38 \times .24635 = \$0.66$$

Where might he have made a mistake?

- A. Input values
 - B. d_1 or d_2
 - C. $N(d_1)$ or $N(d_2)$
 - D. $PV(X)$
 - E. Both A and D
 - F. Both B and C
 - G. There are errors in all steps
 - H. There are no errors
5. The binomial option pricing model relies on a _____ portfolio approach, while the 2 state option pricing model relies on a _____ portfolio.
- A. Replicating; Replicating
 - B. Replicating; Risk-free
 - C. Risk-free; Replicating
 - D. Risk-free; Risk-free
6. Which of the inputs for the Black Scholes option pricing model is most difficult to observe accurately?
- A. Exercise price
 - B. Expiration date
 - C. Risk-free rate
 - D. Stock price
 - E. Volatility

7. We know that _____-style options are generally more valuable than otherwise identical _____-style options.
- American; European
 - Call; Put
 - European; American
 - Put; Call
8. Which of these is the most difficult Black-Scholes input to observe?
- Exercise price
 - Risk free rate
 - Stock price
 - Time
 - Volatility
 - One of the other inputs

Use this table for the following question:

If d is...	Use this as $N(d)$
Any value less than 0.3	0.56
Between 0.3 and 0.5	0.66
Between 0.5 and 0.7	0.73
Between 0.7 and 0.9	0.81
Any value greater than 0.9	0.88

9. Johnny Jim's stock currently trades at \$30. The firm does not pay dividends, and you have estimated its historical volatility to be 50%. The most recent T-bill rate you have seen was 2%. You want to purchase a put option on the firm's stock with 3 months to maturity and an exercise price of \$25. What would you calculate is the value of this option?
- \$0.77
 - \$1.02
 - \$3.28
 - \$5.61
 - A different value

10. You are modeling the price of a put option. The underlying stock currently trades for \$70, and you expect that it will either increase by \$12 or decrease by \$18. The exercise price of the put is \$67. You know that the current T-bill rate is 2.5%. What would you predict the price of the put should be?
- A. \$0
 - B. \$3
 - C. \$5
 - D. \$7
 - E. A different value
11. The binomial model uses a(n) _____ portfolio to price options, while the two state model reinterprets it as a(n) _____ portfolio.
- A. Continuous; Discrete
 - B. Discrete; Continuous
 - C. Replicating; Risk-free
 - D. Risk-free; Replicating
12. What was an assumption we did ***NOT*** make in calculating the option price using the binomial model?
- A. A limited number of potential outcomes
 - B. Borrowing/lending at the risk free rate
 - C. No transaction costs
 - D. The probability of the stock going up
 - E. We assumed all of these
13. Which of the factors affecting option prices can potentially affect two European put options in opposite directions (increasing the value of one and decreasing the value of the other)?
- A. Dividend yield
 - B. Interest rates
 - C. Time to maturity
 - D. Volatility
 - E. All of these always affect prices in the same direction

14. What is the maximum value of a call option at any given time?
- A. \$0
 - B. Its exercise price
 - C. The value of the stock
 - D. There is no limit (infinity)
15. You want to compare the risk of a call option to its underlying stock. You have calculated the call's price to be \$6. Meanwhile, the stock is currently trading at \$48. You found that the hedge ratio for the call is 0.25, while the beta of the stock is approximately 1.25. What is the beta of the call option?
- A. 0.04
 - B. 0.63
 - C. 1.25
 - D. 2.5
 - E. A different value
16. Assuming the two are otherwise equivalent, a _____ style option is generally more valuable than a _____ style option.
- A. American; European
 - B. Call; Put
 - C. European; American
 - D. Put; Call
17. You are considering an investment in a call option. The option has a strike price of \$65, while you see that the underlying stock currently trades for \$69. You see that the option trades for \$7 currently. What is the time value of this option?
- A. \$0
 - B. \$3
 - C. \$4
 - D. \$7
 - E. A different value

18. Increasing which of the following would **DECREASE** the value of an American style put option? Assume that all other aspects remain constant.
- A. Dividend payout
 - B. Strike price
 - C. Time to expiration
 - D. Volatility
 - E. All of these would decrease the value of the put option
 - F. All of these would increase the value of the put option

Use the following information for the next two questions:

If d is...	Use this as $N(d)$
Any value less than -0.4	0.3
Between -0.4 and -0.2	0.38
Between -0.2 and 0	0.47
Between 0 and 0.2	0.56
Any value greater than 0.2	0.62

You are interested in purchasing a call option on Shark of Tanks, Inc. due to its historical volatility of 30%. The particular option you are interested in expires 6 months from today and has an exercise price of \$40. You see that the stock is currently trading at \$40, and the last T-bill rate you saw was 1.5%.

19. Using the information above, calculate the value of d_2 .
- A. -0.4221
 - B. -0.0707
 - C. 0.1414
 - D. 0.2727
 - E. A different value
20. Using the information above, what would you pay for this call option?
- A. \$0.17
 - B. \$2.54
 - C. \$3.74
 - D. \$4.02
 - E. A different value

Use this table for the following question:

If d is...	Use this as $N(d)$
Any value less than -0.15	0.38
Between -0.15 and 0.05	0.5
Between 0.05 and 0.25	0.54
Between 0.25 and 0.45	0.62
Any value greater than 0.45	0.73

21. You want to calculate the price of a call option. The option has an exercise price of \$70, which is the same as the stock's current price. This option has 3 months to expiration. You estimate that the T-bill rate is 2%, and you believe the historical volatility of the stock is 20%. What is the price of this option?
- A. \$2.98
 - B. \$3.87
 - C. \$5.38
 - D. \$6.41
 - E. A different value

Use the following information for the next two questions:

You want to buy a put option on Lario Bros Publishing. The stock currently trades at \$20, while the put expires in 1 year and has an exercise price of \$25. You assume that the stock will either increase by 12.5% or decrease by 25% next year. Further, you know that the T-bill rate for next year is 5%.

22. Using the above information, what is your Δ for this option?
- A. -1
 - B. -0.75
 - C. 0
 - D. 1
 - E. A different value
23. Using the above information, what should the price of this option be?
- A. \$1.19
 - B. \$2.64
 - C. \$3.12
 - D. \$3.81
 - E. A different value

24. You are attempting to price a call option with an exercise price of \$55. You project that the underlying stock will either increase by 30% or decrease by 10% in the next year. Over the same time, you believe that the T-bill rate will be 12.5%. If the current stock price is \$50, what would you pay for this option?
- A. \$0
 - B. \$5
 - C. \$7.50
 - D. \$10
 - E. A different value

Use the following information for the next two questions:

Shares of Table Corp. currently trade for \$80. Using a binomial model, you could replicate a put option on these shares using -0.25 shares and lending out \$22.50. You have estimated Table Corp.'s risk using a beta of 0.75.

25. What is the value of the put option?
- A. \$2.50
 - B. \$5
 - C. \$10
 - D. \$20
 - E. A different value
26. What is the beta of the put option?
- A. -7.5
 - B. -6
 - C. -4
 - D. -0.75
 - E. A different value

Use this table for the following question:

If d is...	Use this as $N(d)$
Any value less than 0.2	0.54
Between 0.2 and 0.4	0.62
Between 0.4 and 0.6	0.69
Between 0.6 and 0.8	0.76
Any value greater than 0.8	0.88

27. [Quantitative] You are interested in purchasing a call option on XL Holdings. XL's stock currently trades for \$50, and you have estimated its historical volatility as 40%. The exercise price of the option is \$50, and it expires 1 year from today. If the current T-bill rate is 20%, what is the value of the call option?
- A. \$3.56
 - B. \$9.75
 - C. \$11.73
 - D. \$12.62
 - E. A different value
28. [Conceptual] When calculating the option price using the binomial model, which of the following assumptions did we **NOT** make?
- A. Ability to invest in a risk-free bond
 - B. Only two potential outcomes
 - C. Probability that the stock price increases
 - D. Rates don't change throughout
 - E. We made all of these assumptions
29. [Conceptual] While the values they calculate are the same, the _____ model uses a risk-free portfolio approach, while the _____ model uses a replicating portfolio approach.
- A. Binomial; Black-Scholes
 - B. Binomial; Two state
 - C. Black-Scholes; Binomial
 - D. Black-Scholes; Two state
 - E. Two state; Binomial

30. [Conceptual] Which of the following is **NOT** a valid interpretation of the option's delta?
- A. It is the dollar change in the option price per \$1 change in share price
 - B. It is the firm's value at risk
 - C. It is the number of shares hedged by 1 option
 - D. It is the number of shares held in the replicating portfolio
 - E. All of these are valid
31. [Conceptual] Which of the following would **INCREASE** the value of a European call option?
- A. Higher dividend payoff
 - B. Higher exercise price
 - C. Higher time to maturity
 - D. Lower interest rates
 - E. None of these would increase the value
32. [Quantitative] You are interested in the riskiness of a put on CellCorp. The put sells for \$10, while its delta is -0.1. The company's shares currently sell for \$90, and you have estimated CellCorp's beta to be 0.5. What is the beta of this option?
- A. -0.45
 - B. -0.25
 - C. 0
 - D. 0.25
 - E. 0.45
 - F. A different value
33. [Conceptual] Which of the following inputs are we most likely to want to "back out" of the Black-Scholes model?
- A. Expiration date
 - B. Risk free rate
 - C. Stock price
 - D. Strike price
 - E. Volatility

34. [Quantitative] You are modeling the value of a put option on Vader Consulting. The firm's current stock price is \$80, and the put's exercise price is \$74. You assume that the firm's price will either increase by 30% or decrease by 20% over the next year. If the T-bill rate is 4%, what is the value of the put option?
- A. \$5
 - B. \$6
 - C. \$7
 - D. \$8
 - E. A different value
35. [Conceptual] Which of the following is ***NOT*** always true of option values?
- A. A call cannot be worth more than the underlying stock price
 - B. A put cannot be worth more than the exercise price
 - C. An American option must be worth at least as much as an equivalent European option
 - D. An index option is worth less than a portfolio of the individual stock options
 - E. All of these are true
36. [Quantitative] A call on Bones Productions sells for \$17. What is the intrinsic value of this call if the call's exercise price is \$70 and the underlying stock price is \$78?
- A. \$0
 - B. \$8
 - C. \$9
 - D. \$17
 - E. A different value
37. [Conceptual] Which of the following might have differing effects on the value of a European put option?
- A. Higher volatility
 - B. Increased interest rates
 - C. Lower stock price
 - D. More time to expiration
 - A. All of these always increase the value

38. [Quantitative] You have calculated the beta of a call option on O'Reilly Bail Bonds. You figure that the option's beta is 3. The call sells for \$8, while the firm's shares sell for \$40. If the delta of the option is 0.5, what is the beta on the underlying stock?
- A. 1
 - B. 1.2
 - C. 1.4
 - D. 1.6
 - E. A different value
39. [Quantitative] You are modeling the price of a call option using a two-period binomial model. The stock price is currently \$20, and it can increase by \$10 or decrease by \$5 each period. The exercise price of the option is \$25, and the relevant risk-free rate for each period is 25%. What is the value of the option today?
- A. \$5.33
 - B. \$6.67
 - C. \$8
 - D. \$10
 - E. All of these are true