

Derivatives Questions

Question 1

What does the Black-Scholes stock option pricing model assume about the probability distribution of the stock price in one year? What does it assume about the continuously compounded rate of return on the stock during the year?

Question 2

The volatility of a stock is 30% per annum. What is the standard deviation of percentage price change in one trading day?

Question 3

Explain the principle of risk-neutral valuation

Question 4

Calculate the price of a 3-month European put option on a non-dividend-paying stock with a strike price of \$50 when the current stock price is \$50, the risk-free interest rate is 10% per annum, and the volatility is 30% per annum.

Question 5

What is implied volatility? How can it be calculated?

Question 6

A call option on a non-dividend-paying stock has a market price of \$2.5. The stock price is \$15, the exercise price is \$13, the time to maturity is 3 months, and the risk-free interest rate is 5% per annum. What is the implied volatility?

Question 7

Which of the following is part of the Black-Scholes-Merton equation?

- a. Expected return on a stock
- b. Standard deviation of a stocks return
- c. A Wiener variable
- d. The cumulative normal distribution function

Question 8

Which of the following is not an assumption of the Black-Scholes-Merton model?

- a. No short selling
- b. There is a risk free rate that doesn't change and is constant for all periods
- c. No taxes
- d. No transaction costs

Question 9

If d_1 has been established as +0.2321 for a 3 month European put option with a risk free rate of 4% and volatility of 20%, what is the value of d_2 ?

- a. +0.3321
- b. +0.2821
- c. +0.1821
- d. +0.1321

Question 10

A **European Call option** has been issued with 4 months to expiry and a strike price of \$40. The current spot price is \$36, and the risk free rate is 2%. Given $N(d_1) = 0.2704$ and $N(d_2) = 0.2248$. What is the option value?

- a. \$0.80
- b. \$1.21
- c. \$2.97
- d. \$4.53

Question 11

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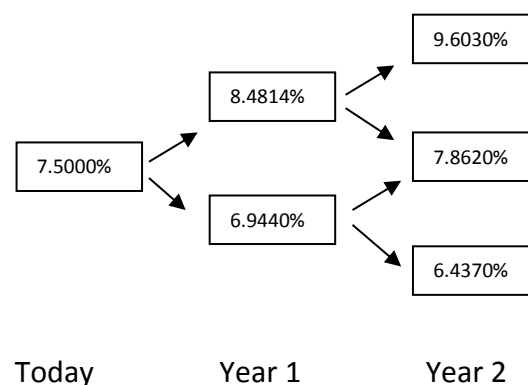
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Question 12

Explain why a callable bond's price would be expected to decline less than an otherwise comparable option-free bond when interest rates rise. If necessary use a numeric example.

Question 13

Use the following arbitrage-free binomial interest rate tree to answer the questions that follow:



- a. What is the value of a 3-year Treasury bond with a 9% coupon rate?
- b. What is the value of a 2-year call option on a bond that currently has three years to maturity and coupon rate of 9% if the strike price is 98? Assume in this calculation that the current price of the 3-year Treasury bond is the value found in part i).

Question 14

The intrinsic value of an out-of-the-money option is:

- a. equal to the time value of the option
- b. negative
- c. zero
- d. equal to the exercise price of the option

Question 15

The implied volatility of an option is the standard deviation of _____ that is consistent with the option's current market value.

- a. returns for the call option
- b. returns for the underlying stock
- c. T-bill returns
- d. returns for the corresponding put option

Question 16

A call option that expires in 10 days has a strike price of \$20. The underlying stock has a current price of \$40 per share. What is the likely value of $N(d_1)$ in the Black-Scholes option pricing model?

- a. Close to 1
- b. Negative and close to 0
- c. Positive and close to 0
- d. Close to 0.5

Question 17

Use the Black-Scholes model to calculate the value of a three-month European put option with an exercise price of \$60. The risk-free rate is 3% and the standard deviation is 30%. The current stock price is \$50 per share. The stock does not pay dividends. Which of the following is closest to the value of the put?

- a. \$8
- b. \$10
- c. \$12
- d. \$14

Question 18

Use the Black-Scholes model to calculate the value of a three-month European call option with an exercise price of \$40. The risk-free rate is 3% and the annual standard deviation is 30%. The current stock price is \$50 per share. The stock does not pay dividends. Which of the following is closest to the value of the call?

- a. \$10.50
- b. \$12.00
- c. \$14.50
- d. \$20.00

Question 19

A call option with an exercise price of \$30 has a price of \$4. The underlying stock price is \$28, the risk-free rate of interest is 3%, and there are three months until expiration of the call. Use put-call parity to find the value of a three-month put option on the same stock with an exercise price of \$30

- a. \$3.18
- b. \$4.00
- c. \$5.00
- d. \$5.78

Question 20

All of the following are important assumptions underlying the Black-Scholes formula except:

- a. The stock will pay a constant, continuous dividend yield until the option expiration date
- b. Market is inefficient and there are transaction cost and taxes
- c. Interest rate, variance rate, both are known functions of time; any changes are perfectly predictable
- d. Stock prices are continuous, meaning that sudden extreme jumps are ruled out.

Question 21

Prior to expiration, the time value of a call option is equal to ____

- a. exercise price of the call - intrinsic value of the call
- b. call price - stock price
- c. call price - intrinsic value of the call
- d. exercise price of the call - stock price