

CFE: Level 1 Exam Sample Questions

The following are the sample questions that are illustrative of the questions that may be asked in a CFE Level 1 examination. These questions are only for illustration.

Note: (i) Each question carries 5 marks

(ii) In the actual exam, every wrong answer would earn -3 (negative 3) marks;

(iii) Use of Excel™ spreadsheet, even though not essential, may prove useful for answering some of the questions. No more than 20% of the total questions may require the use of Excel spreadsheet.

1. If we assume that the stock market behaves in a manner where we witness frequent small jumps and infrequent large jumps, as has been witnessed in the last couple of years, then the best stochastic model to explain this phenomenon would be:
 - (a) Merton's Jump Diffusion model
 - (b) Kou's double exponential model
 - (c) Variance Gamma model
 - (d) Cox-Ross square root model
2. Since the financial crisis of 2007-2008, Bloomberg (a leading service provided for financial information and data) has been promoting a model developed by their own quant team that it thinks is best suited to value barrier options. This model is based on:
 - (a) Local Volatility
 - (b) Stochastic Volatility
 - (c) Stochastic Local Volatility
 - (d) None of the above
3. If you try to calculate the value of the function $y = \sqrt{x}$ in Excel by inputting the value of x as a negative number such as, -1 or -2, you will get:
 - (a) #VALUE error
 - (b) #NAME error
 - (c) #NUM error
 - (d) None of the above
4. While using a "user defined function" written in VBA in Excel, you get the following error message: #VALUE. This means:
 - (a) Excel is unable to calculate the formula in the cell properly;
 - (b) Excel cannot recognize the name of the function in the cell address
 - (c) You have inputted a "string" where "numeric" value was required
 - (d) None of the above

5. “Death Spiral” Convertible Bonds, the infamous financial derivative instrument that was associated with Lehman Brothers and Livedoor company in Japan in 2008, have:
- (a) Exploding strike prices
 - (b) Resettable strike prices
 - (c) Excessive leverage
 - (d) None of the above
6. Capital Asset Pricing Model (CAPM) is an equilibrium model of asset price, where
- (a) Under a real probability measure, expected return of a stock is expressed in terms of the expected market return
 - (b) Under a risk neutral probability measure, expected return of a stock is expressed as a linear combination of the risk free return and the market excess return
 - (c) Under a risk neutral probability measure, the risk premium on a stock is expressed in terms of the risk of the market
 - (d) Under a risk neutral probability measure, the beta of a stock is expressed in terms of the variance of the market portfolio
7. A stock has an expected return of 17% and volatility of 20%, whereas a bond has an expected return of 5% and volatility of 11%. The correlation between the returns of the stock and the bond is -0.25 (minus 0.25). If the returns of the stock and the bond follow a Normal distribution then the probability of the stock outperforming the bond is approximately:
- (a) 49%
 - (b) 57%
 - (c) 68%
 - (d) 73%
8. The following is the payoff of an Amortizing call option:
- (a) $\frac{\max(S_T - K, 0)}{S_T}$
 - (b) $\frac{\max(S_T - K, 0)}{(S_T - K)}$
 - (c) $\frac{\max(S_T - K, 0)}{K}$
 - (d) None of the above

9. A barrier option trader will find which of the following volatility measure quite useful:
- (a) GARCH
 - (b) Exponentially Weighted Moving Average (EWMA)
 - (c) Parkinson Number
 - (d) Garman Klass Estimator
10. Which of the following is true about Fibonacci numbers and the Golden ratio
- (a) The Golden ratio converges to the ratio of two consecutive Fibonacci numbers
 - (b) A Fibonacci sequence can be expressed as an eigenvalue problem and the Golden Ratio is one of the eigenvalues of the Fibonacci matrix
 - (c) Both the Fibonacci numbers and the Golden Ratio are used by technical analysts to trade stocks and FX
 - (d) All of the above
11. If the probability associated with a Gamma distribution is 35% and the alpha and the beta parameters of the distribution are 3 and 2 respectively then the inverse of the gamma cumulative distribution would be:
- (a) 1.85
 - (b) 2.95
 - (c) 4.19
 - (d) 5.86
12. A stock is currently trading at 100 and you are valuing a 2 year ATM call option on this stock using a two period Cox-Ross-Rubenstein (CRR) tree. The constant risk free rate is 3%, the dividend yield is 2% and the volatility is 15%. The risk neutral probability of the stock moving up is:
- (a) 43.45%
 - (b) 46.15%
 - (c) 49.59%
 - (d) 52.18%
13. In the above two period CRR tree (question #12), the value of the 2 year ATM call option on the stock is:
- (a) 6.14
 - (b) 7.35
 - (c) 8.10
 - (d) 8.85

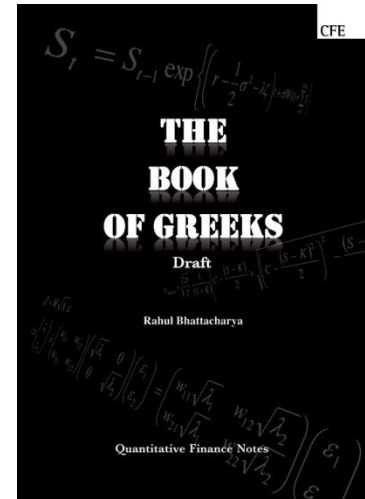
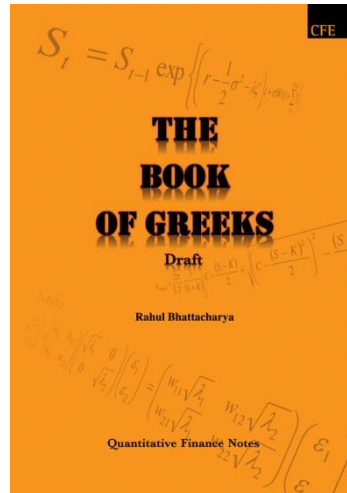
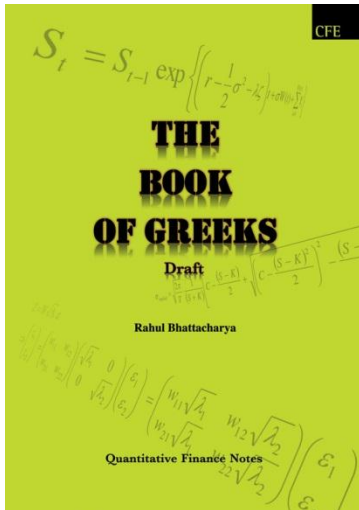
14. The growth of money in a savings account can be represented as:
- (a) Ordinary differential equation
 - (b) Partial differential equation
 - (c) Stochastic differential equation
 - (d) None of the above
15. A degenerate asset is one where:
- (a) the drift is zero
 - (b) the volatility is zero
 - (c) both the drift and the volatility is zero
 - (d) the volatility is infinite
16. Negative probabilities, more or less a surreal concept, can:
- (a) happen in a Monte Carlo simulation path
 - (b) happen in a CRR Binomial tree
 - (c) happen when an asset is degenerate
 - (d) never happen.
17. Skew and Kurtosis, the third and the fourth moment of a probability distribution respectively, are also measures of risk. When a bank lends money to customers, it is exposed to:
- (a) Positive skew
 - (b) Negative skew
 - (c) Positive skew and high kurtosis
 - (d) High kurtosis
18. Napoleon options, introduced by Goldman Sachs in early 2000s, are a kind of:
- (a) Cliquets
 - (b) Reverse Cliquets
 - (c) Amortizing option
 - (d) Barrier options
19. If the profit and loss of a trader in bank follows a Brownian motion then which of the following statements is true:
- (a) In a 12 month period, he would make profits for 6 months and lose money for 6 months;
 - (b) In a 12 month period, he would either make profits for only 1 month and lose money for 11 months or make profits for 11 months and lose money in only 1 month;
 - (c) In a 12 month period his profit and loss pattern cannot be predicted at all;
 - (d) In a 12 month period, he'd either make money for all 12 months or lose money for all 12 months.

20. A trader is given an order to buy 200,000 shares of stock ABC and achieve VWAP price. If between 10:00 am and 10:15 am, 14% of the day's volume in that particular stock traded over an exchange with a volatility of 10%, then within this 15 minute period how many shares does the trader need to buy to attain VWAP price?
- (a) 17,200
 - (b) 28,000
 - (c) 2,800
 - (d) None of the above
21. You are valuing an Oil Refinery. Which of the financial derivative instrument would be most suitable for this exercise?
- (a) Amortizing option
 - (b) Forward Start option
 - (c) Spread option
 - (d) Pyramid option
22. Recently it was observed in the Sovereign bond markets in Europe that price of a bond can be hugely impacted due to a small shift in a bond's value. Borrowing a concept from the CDO markets, the investors termed it as:
- (a) Rainbow risk
 - (b) Cliff risk
 - (c) Signal risk
 - (d) Forward value risk
23. Cholesky Decomposition is used in:
- (a) Trinomial tree valuation of options
 - (b) Monte Carlo simulation of multi-assets
 - (c) Adaptive mesh method for pricing barrier options
 - (d) Cash flow mapping in VaR estimation
24. An asset is trading at 100 and the volatility is 15%. The price of an ATM vanilla call option on this asset is \$3.58. The price of a fixed strike ATM lookback call option on this asset will be:
- (a) 1.79
 - (b) 5.90
 - (c) 6.20
 - (d) 7.16

25. A Risk manager is analyzing the market risk of a book of USD/JPY options of varying maturities. She is interested in finding out how the Dollar value of this portfolio will change with a one point move in the volatility of the underlying USD/JPY rate. The best method for doing this would be:
- (a) Delta normal VaR
 - (b) Delta-Gamma VaR
 - (c) Vega VaR
 - (d) Price Vol Matrix
26. Which of the following is true about a Brownian motion:
- (a) It is a mean reverting process
 - (b) It is a random walk plus a drift
 - (c) It involves random numbers drawn from a Normal distribution
 - (d) All of the above
27. Which of the following is true about the Black-Scholes option pricing formula:
- (a) $N(d_2)$ is the probability of the option finishing in the money and $N(d_1)$ is not a probability measure
 - (b) $N(d_1)$ is the probability of the option finishing in the money and $N(d_2)$ is not a probability measure
 - (c) Neither $N(d_1)$ nor $N(d_2)$ is a probability measure
 - (d) Both $N(d_1)$ and $N(d_2)$ are probabilities under different measures.
28. In Excel™ we can calculate the cumulative normal probability distribution function, $N(\cdot)$ by using the following function:
- (a) =NORMSINV(·)
 - (b) =NOMRDIST(·)
 - (c) =NORMSDIST(·)
 - (d) =NORM(·)
29. Which of the following is true about “Style” analysis to measure the performance of an investment fund:
- (a) It is based on the “asset class factor model” developed by Sharpe in early 1990s;
 - (b) It is very much like reverse engineering the asset mix in a portfolio
 - (c) In this method, we construct a benchmark portfolio from a given set of indices against which the performance of an investment fund’s actively managed portfolio is compared;
 - (d) All of the above;

30. Which of the following is true about the Cholesky matrix used in quant finance:

- (a) It is a symmetric matrix
- (b) It is a lower triangular matrix
- (c) It is a diagonal matrix
- (d) It is the transpose of the product of correlation matrix and volatility matrix



Answers:

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|-----|-----|-----|-----|
| 1. | (c) | 18. | (b) |
| 2. | (c) | 19. | (b) |
| 3. | (c) | 20. | (b) |
| 4. | (c) | 21. | (c) |
| 5. | (b) | 22. | (b) |
| 6. | (a) | 23. | (b) |
| 7. | (c) | 24. | (d) |
| 8. | (a) | 25. | (c) |
| 9. | (c) | 26. | (d) |
| 10. | (d) | 27. | (d) |
| 11. | (c) | 28. | (c) |
| 12. | (c) | 29. | (d) |
| 13. | (d) | 30. | (b) |
| 14. | (a) | | |
| 15. | (b) | | |
| 16. | (b) | | |
| 17. | (b) | | |