

CFE: Level 1
Sample Questions Set #3

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. A stock has a volatility of 25% per annum and is expected to return 11% in one year. A bond has a volatility of 9% per annum and is expected to return 7% in one year. The correlation between the return of the stock and the bond is -0.25. What is the probability of stock outperforming the bond in one year?
 - (a) 45%
 - (b) 56%
 - (c) 68%
 - (d) 72%

2. Stochastic Volatility models can be best viewed as:
 - (a) a Brownian Bridge
 - (b) a Brownian motion with a random clock
 - (c) a Brownian motion with mean reversion built in the drift
 - (d) a Brownian motion with a volatility function tied to the Weiner process

3. Hysteresis, a concept in physics and a phenomenon observed in many physical systems, is sometimes observed in the:
 - (a) Equity markets
 - (b) FX markets
 - (c) Interest rate markets
 - (d) Credit markets

4. Which of the following functions / numbers cannot be estimated in Excel™:
 - (a) Modified Bessel function
 - (b) Real coefficient of a complex number
 - (c) Natural logarithm of a Gamma function
 - (d) All of the above numbers can be estimated in Excel™

5. A risk manager working for a Sovereign Wealth fund wants to cluster assets using the correlation of returns of various assets. If ρ is the correlation coefficient between the returns of asset i and asset j then the best way she should measure distance between two asset (returns) should be:
- $\frac{1-\rho}{2}$
 - $\frac{1-\rho}{\rho^2}$
 - $\sqrt{(1-\rho^2)(1+\rho^2)}$
 - $\frac{\rho-1}{2}$
6. The drift (domestic risk free rate minus the foreign risk free rate) of EUR/USD currency pair is 1% and the volatility is 12%. Which of the following statements is TRUE regarding the currency pair USD/EUR?
- The drift is 1% and the volatility is 12%
 - The drift is 0.44% and the volatility is 12%
 - The drift is 1.85% and the volatility is 10%
 - The drift is 2.44% and the volatility is 12%
7. One of the biggest advantages of Libor Market Model (LMM) is:
- it is mathematically a much more tractable model;
 - it uses observable forward rates as factors
 - it models the entire term structure of the yield curve as opposed to a single short rate;
 - it avoids the incorporation of unrealistic mean reversion phenomenon
8. For a correlation matrix which of the following relationships hold:
- the sum of the eigenvalues of the matrix is equal to the determinant of the matrix.
 - the product of the eigenvalues of the matrix is equal to the determinant of the matrix.
 - the sum of the squares of the eigenvalues of the matrix is equal to the determinant of the matrix;
 - the sum of the squares of the eigenvalues of the matrix is equal to the inverse of the determinant of the matrix

9. Vanna-Volga method is primarily used to value:
- (a) Equity exotic options
 - (b) FX exotic options
 - (c) Interest Rate exotic options
 - (d) Credit linked notes and exotic options
10. Price-Vol matrix is essentially a:
- (a) market risk management technique mostly used by risk managers
 - (b) trading risk management technique used by option traders
 - (c) a technique to construct volatility surface mostly used by sell side quants
 - (d) None of the above;
11. A Call on asset S with a strike price of K with a rate of r_d and a counter-asset rate of r_f can be priced as a:
- (a) Call on $1/S$ with a strike price of $1/K$ with a risk-neutral rate of r_f and a counter-asset rate of r_d
 - (b) Put on $1/S$ with a strike price of $1/K$ with a risk-neutral rate of r_f and a counter-asset rate of r_d
 - (c) Put on S with a strike price of K with a risk-neutral rate of r_f and a counter-asset rate of r_d
 - (d) None of the above;
12. In or around 2002 Goldman Sachs introduced an equity exotic option on which the bank itself, together with many other banks in the City, lost a considerable amount of money. This episode in a major way contributed to the introduction of the Stochastic Volatility Models in the valuation of exotic options. That product was:
- (a) Himalayan option
 - (b) Israeli option
 - (c) Napoleon option
 - (d) Digital Cliquet options

13. The LIBOR Squared swap was introduced (and sold) by Bankers' Trust to a corporate client in the early 1990s. If L is the Libor, K is the strike price and A is the notional quantity then the payoff was given by:

$$\text{Payoff} = \begin{cases} A*(L - K)^2 & \text{if } L > K \\ -A*(K - L)^2 & \text{if } L < K \end{cases}$$

A defining characteristic of this product was that:

- (a) it had very large convexity (gamma) embedded in it
 - (b) the product had a very small delta but a very large gamma
 - (c) the payoff was convex at some points on the map and concave at other points and at origin there was no optionality;
 - (d) At the origin the gamma became infinite
14. Kalman Filter, perhaps, the electrical engineering equivalent of Einstein's $E = mc^2$ formula, is widely used in avionics, control systems, space vehicles, etc. Kalman filter is present in:
- (a) Volatility surface models for pricing exotic options
 - (b) Exponentially Weighted Moving Average method of estimating historical volatility
 - (c) Analysing the auto-correlation of stock returns
 - (d) Volume Weighted Average Price trading strategy for stocks
15. Put-Call Parity implies that:
- (a) a call and a put have the same time value
 - (b) a call and a put have the same magnitude of intrinsic value
 - (c) the difference between a call and put is equal to the discounted spot
 - (d) None of the above
16. A bank has allowed a high net worth investor to open a trading account whereby the investor can buy and sell a basket of stocks under certain constraints and restrictions. If she makes a profit she can withdraw it while if there is a loss on the account then the bank covers the loss. This is an example of:
- (a) Israeli option
 - (b) Passport option
 - (c) Timer option
 - (d) None of the above

17. Which of the following is true about a high frequency trader?
- (a) He makes money on bid-ask spread in return for being hit on the wrong side (he can be a buyer in a falling market or selling in a rising market);
 - (b) He places voluntary bids and offers on a large number of stocks in both public and semi-public venues;
 - (c) His expected returns are typically between 0.01% and 0.10% per position;
 - (d) All of the above;
18. Wall Street Journal has termed this decade as the "Zero Decade" given the U.S. Federal Reserve Bank's decision to keep short term rates near zero for another 3 years. The Japanese short term rates have been at zero or near zero for 2 decades. These facts primarily challenge the:
- (a) Log-normal (Geometric Brownian Motion) model for interest rates;
 - (b) Mean Reversion (Vasicek, CIR, etc.) model for interest rates;
 - (c) Normal (Arithmetic Brownian Motion) model for interest rates;
 - (d) Jump Diffusion model for interest rates
19. The Fourier Transform (and the FFT methodology) can be applied to:
- (a) Valuation of vanilla options under Gaussian distribution;
 - (b) Valuation of vanilla options under Variance Gamma distribution;
 - (c) Valuation of vanilla options under (Heston's) stochastic volatility assumption;
 - (d) All of the above
20. Which of the following stochastic processes describes the dynamics of "correlation" between two random variables, such as an asset and its volatility:
- (a) Bessel process
 - (b) Cox-Ross process
 - (c) Jacobi process
 - (d) Kou Double Exponential process