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 rho 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:

   (a) $\frac{1-\rho}{2}$
   (b) $\frac{1-\rho}{\rho^2}$
   (c) $\sqrt{(1-\rho^2)(1+\rho^2)}$
   (d) $\frac{\rho-1}{2}$

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?

   (a) The drift is 1% and the volatility is 12%
   (b) The drift is 0.44% and the volatility is 12%
   (c) The drift is 1.85% and the volatility is 10%
   (d) The drift is 2.44% and the volatility is 12%

7. One of the biggest advantages of Libor Market Model (LMM) is:

   (a) it is mathematically a much more tractable model;
   (b) it uses observable forward rates as factors
   (c) it models the entire term structure of the yield curve as opposed to a single short rate;
   (d) it avoids the incorporation of unrealistic mean reversion phenomenon

8. For a correlation matrix which of the following relationships hold:

   (a) the sum of the eigenvalues of the matrix is equal to the determinant of the matrix.
   (b) the product of the eigenvalues of the matrix is equal to the determinant of the matrix.
   (c) the sum of the squares of the eigenvalues of the matrix is equal to the determinant of the matrix;
   (d) 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:

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

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 the 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 returs 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 dyanmics 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