Question 1

Which of the following is not a relevant consideration for a trader desirous of delta hedging his or her options portfolio?

Options:

A- Rebalancing frequency

B- Cost per trade

C- Volatility of the underlying

D- Bid-offer spreads on the underlying

Answer:

B

Explanation:

The greater the rebalancing frequency, the more effective the hedge. But the higher the rebalancing frequency (ie the how often the hedge is true-ed up as a response to changes in the market), higher are the transaction costs. Higher transaction costs reduce hedge

performance. Therefore transaction costs limit the ability of traders to continuously trade and keep delta at or close to zero. Transaction costs include a number of elements, including market impact costs, dollar costs per trade, and the bid-offer spread on the security.

Traders have to strike a balance between transaction costs and the rebalancing frequency when making decisions on hedging. Bid-offer spreads, cost per trade and the rebalancing frequency are therefore relevant considerations. The volatility of the underlying is not something the trader would consider when taking decisions to delta hedge (unless as part of an active bet on future volatility) and therefore Choice 'c' is irrelevant to the trader's decision, and is the correct answer.

Question 2

Which of the following statements are true:

1. Rebalancing frequency is a consideration for a risk manager when assessing the adequacy of delta hedging procedures on an options portfolio

II. Stock options granted to employees that are exercisable 5 years in the future will lead to a decline in the share price 5 years hence only if the options are exercised.

III. In a delta neutral portfolio, theta is often used as a proxy for gamma by traders.

IV. Vega is highest when the option price is close to the strike price

Options:

A- II

B- I, II, III and IV

C- III and IV

D- I, III and IV

Answer:

D

Explanation:

Delta hedges need to be rebalanced periodically because with changes in prices, delta changes, and the amount of hedge required changes as well, requiring a readjustment. The more frequent the rebalancing, the better the performance of the hedge. However, the greater the rebalancing frequency, the greater are the number of trades required, increasing the costs from trading. The trader has to balance transaction costs against the adverse effects from poorer hedge performance. Therefore rebalancing frequency is a consideration for a trader and statement I is true.

Statement II is not true. When options are granted, their future impact on the price gets priced in into the current price, and no change occurs when these are actually exercised.

Statement III is true. Consider the Black Scholes PDE

202.23.e1

and substitute delta = 0 (as this is a delta neutral portfolio), and we get the result 202.23.e. Since r is generally small, a large negative theta means a large positive gamma and vice-versa. Therefore theta can be used as a proxy for gamma and this statement is correct.

Statement IV is correct. Vega is highest closest to the strike price - look at the graph for vega to see how vega behaves with changes to spot. (Do it yourself or there is a graph in the tutorial too.)

Question 3

Which of the following statements are true:

1. A deep in-the-money call option has a value very close to that of a forward contract with a forward price equal to the exercise price

II. If the volatility of a stock goes down to zero, the value of a call option on the stock will tend to be close to that of a forward contract so long as the option is in the money.

III. All other things remaining the same, the issue of stock warrants exercisable at a future date will cause a decline in the current stock price

IV. Implied volatilities are calculated from market prices of options and are forward looking

Options:

A- I and IV

B- II and III

C- III and IV

D- All of the above

Answer:

D

Explanation:

All the statements are correct, therefore Choice 'd' is the correct answer. Let us look at each of these statements one by one.

1. A deep in-the-money call option has a value very close to that of a forward contract with a forward price equal to the exercise price. This is true because a deep in the money call option is most likely to be exercised, and is therefore effectively like a forward contract to buy the stock at the exercise price.

We can also look at this using the BSM formula for a call option. If c be the value of a call option, and all other variables have their usual meaning (S0 is the spot price, K is exercise price, and t is time to expiry), then according to the Black Scholes model the value of a call is given by the following expression:

202.22.e1

As S0 becomes large, d1 and d2 become large, and therefore N(d1) and N(d2) approach 1, leaving the value of the call to be equal to 202.22.e2, which is the formula for a forward contract.

II. If the volatility of a stock goes down to zero, the value of a call option on the stock will tend to be close to that of a forward contract so long as the option is in the money.

Again, this is true because if volatility is low or zero, the stock price will grow at its expected rate, and end up to be what the forward price is (S0 ert). If the option is out of the money, the value of the option will tend to 0.

III. All other things remaining the same, the issue of stock warrants exercisable at a future date will cause a decline in the current stock price.

This is true because the stock warrants are likely to be exercised only when they are in the money, ie when their exercise price is less than the going stock price, and at that time it will dilute the value of the existing shares. However, the reduction in the price is priced into the share price at the time of the issue of the warrants, and it is not that the share price falls the day they are exercised.

IV. Implied volatilities are calculated from market prices of options and are forward looking. This statement is true: historical volatilities calculated from past prices are backward looking, while 'implied volatility' is the volatility implied from market prices, and is forward looking as it encapsulates the market's view of how volatile the future is likely to be.

Question 4

Question Type: **MultipleChoice**

If , and represent the delta, gamma and theta of any derivative whose value is V; r be the risk free rate; be the volatility and S the spot price of the underlying, which of the following equations will hold true? (Note that is the notation used for partial derivatives)

1. 202.21.q1

II. 202.21.q2

III. 202.21.q3

IV. 202.21.q4

Options:
A- III and IV

B- II

C- I and II

D- III

Answer:
C

Explanation:

This question relates to the Black Scholes PDE (partial differential equation). The Black Scholes PDE is derived by combining the results of a stock price following a Weiner process with a mathematical result known as Ito's lemma and holds true for all derivatives whose prices depend upon S, the price of the underlying and upon t, which indicates time.

The derivation of the Black Scholes PDE is beyond the scope of the PRM syllabus (and also of the author of this question), but we need to know what it is. The PDE can be written as:

202.21.q1

Substituting , this can also be written as

202.21.e

202.21.q2

Therefore the first and the second equations are correct, and the other two are wrong. Choice 'c' is the correct answer.

You should know the PDE in case there is a numerical question about it. The two ways of writing it (as I and II above in the question) express the same relationship. The BSM formula itself for valuing a vanilla European option is based upon the PDE. Most other options are also valued using the fundamental relationship expressed in the PDE.

Question 5

Question Type: **MultipleChoice**

Which of the following statements are true:

1. Protective puts are a form of insurance against a fall in prices

II. The maximum loss for an investor holding a protective put is equal to the decline in the value of the underlying

III. The premium paid on the put options held as a protective put is a loss if the value of the underlying goes up

IV. Protective puts can be a useful strategy for an investor holding a long position but with a negative short term view of the markets

Options:

A- I and IV

B- I, III and IV

C- II and III

D- I, II, III and IV

Answer:

B

Explanation:

A protective put is a put option purchased to protect against the fall in value of a long position. If the price of the underlying in respect of the long position goes down, the put options helps limit losses. If the price of the underlying goes up, the premium paid on the puts is lost but the investor gets to keep the entire upside from the rise in the price.

Therefore statements I, III and IV are correct. Statement II is not correct as any decline in the value of the underlying is offset by the gain from the put, which is the entire idea behind a protective put.

Question 6

A stock is selling at $90. An investor writes a covered call on the stock with an exercise price of $100 in return for a premium of $3 per share. What would be the maximum gain or loss per share that the investor could make on this position?

Options:

A- Maximum gain of $3, and no losses are possible as this is a covered call

B- Maximum gain of $10; maximum loss of $90

C- Maximum gain of $13; maximum loss of $87

D- Maximum gain of $10; maximum loss of $87

Answer:

C

Explanation:

Once the price of the stock exceeds $100, the investor would forego any additional gains as the call would be exercised. Therefore the maximum gain to the investor is $10, plus the premium earned, which is $3, making for a maximum gain of $13.

In the event the stock price declines, the investor would lose on his long stock position an amount equal to the decline, less any premium earned. The worst case price for a stock is 0, and in this case the investor would lose his $90 in the stock, offset by $3 in premiums earned (the written call would expire worthless), thereby limiting his total loss to $87.

Choice 'c' is therefore the correct answer.

Question 7

Question Type: MultipleChoice

Which of the following statements is not true about covered calls on stocks

Options:

A- A covered call is intended to benefit from stock prices not rising

B- In the event of the prices of the underlying falling, the losses of the holder of the covered call are reduced to the extent of the premium earned

C- A covered call is a position that includes a long stock position combined with a short call

D- The holder of a covered call theoretically faces unlimited losses in the event of a rise in the price of the underlying

Answer:

D

Explanation:

A covered call is an attempt to earn premium income by selling calls while protecting against the downside by holding long the underlying. In case prices rise, the holder of the covered call can give away the held underlying. In case prices fall or stay below the strike price of the sold call, the holder of the covered call gets to keep the premium.

The holder of the covered call will suffer a loss if the price of the underlying declines due to the long position held in the underlying. However, these losses will be partly offset by the premiums earned on the calls sold.

Choice 'd' does not represent a correct statement as in the event of a rise in the price of the underlying the holder of the covered call will lose any upside, but will not have unlimited losses. In the event of a decline in stock prices, his losses will be equal to the loss on the

underlying, minus the premium earned.

Question 8

An investor believes that the market is likely to stay where it is. Which of the following option strategies will help him profit should his view be proven correct (assume all strategies described below are long only)?

Options:

A- Strangle

B- Collar

C- Butterfly spread

D- Straddle

Answer:

C

Explanation:

Only the butterfly spread has a payoff profile that benefits when prices do not move much. The collar benefits during declining markets, the straddle and the strangle benefit from sharp movements in the markets. Therefore Choice 'c' is the correct answer.

Question 9

Question Type: MultipleChoice

An investor has a bullish outlook on the market. Which of the following option strategies would suit him?

1. Risk reversal

II. Collar

III. Bull spread

IV. Butterfly spread

Options:

A- II and IV

B- I, III and IV

C- I and III

D- I, II, III and IV

Answer:

C

Explanation:

The investor would benefit from the risk reversal and the bull spread as both these strategies have a payoff profile that benefit from rising prices of the underlying. The collar is the opposite of risk reversal, and benefits during a bear market, and the butterfly spread benefits when prices remain range bound. Therefore Choice 'c' is the correct answer.