

Lab 2: Risk management and the Greek letters I

Question 1:

- i) Define delta, gamma and vega for an individual derivative.
- ii) Explain how gamma and vega can be used in the risk management of a portfolio that is delta hedged.

Question 2:

Derive the delta of a European call option, where

- i) the underlying stock pays no dividend.
- ii) the underlying stock pays a continuous dividend q .

Question 3:

Derive the gamma of a European call option, where

- i) the underlying stock pays no dividend.
- ii) the underlying stock pays a continuous dividend q .

Question 4:

Derive the theta of a European call option, where

- i) the underlying stock pays no dividend.
- ii) the underlying stock pays a continuous dividend q .

Question 5:

What is the delta of a short position in 1,000 European call options on silver futures? The options mature in 8 months, and the futures contract underlying the option matures in 9 months. The current 9-month futures price is \$8 per ounce, the exercise price of the options is \$8, the risk-free interest rate is 12% per annum, and the volatility of silver futures prices is 18% per annum.