Lab 3: Risk management and the Greek letters II

Question 1:

Calculate the delta of an at-the-money six-month European call option on a non-dividend-paying stock when the risk-free interest rate is 10% per annum and the stock price volatility is 25% per annum.

Question 2:

Derive the vega of a European put option, where

i) the underlying stock pays no dividend.

ii) the underlying stock pays a continuous dividend q.

Question 3:

Derive the vega 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 rho of a European put option, where

i) the underlying stock pays no dividend.

ii) the underlying stock pays a continuous dividend q.

Question 5:

A financial institution has just sold $1{,}000$ 7-month European call options on the Japanese yen. Suppose that the spot exchange rate is 0.80 cent per yen, the exercise price is 0.81 cent per yen, the risk-free interest rate in the United States is 8% per annum, the risk-free interest rate in Japan is 5% per annum, and the volatility of the yen is 15% per annum. Demonstrate your calculations for finding

i) delta,

ii) gamma,

iii) vega,

iv) theta, and

v) rho

of the financial institution's position.

vi) Interpret each number.