Assignment-3

1. Change in stock price=$55-$50=$5
   Gamma =0.05
   Change in Delta=5*0.05=0.25
   New Delta=0.60+0.25=0.85
   Total Delta for 100 call option=0.85*100=85
   To be delta-neutral, the total Delta of the position should be zero.
   Δstock+Δtotal new=0
   Δstock=$-\Delta$total new
   Δstock=-85
   We need to short 85 shares

2. Change in implied volatility=25%-20%=5%
   vega=0.25
   Change in put option price=0.25*5%=1.25%
   1.25% change will occur in put option price when volatility is increase by 5%
   For example the put option price is $100 , then new price will be $101.25

3. Theta=-0.05
   Number of option=50
   Number of days=10
   Daily Theta decay=-0.05*50=-2.5
   Total decay after next 10 days=-2.5*10=-25
   The value of 50 call options will decrease by $25 due to time decay over this period.

5. Option Greeks provide various factors which affect the price of options.
   Some of them are:
   1 Delta= rate of change of premium for every unit change in the underlying price.
   2 Gamma=rate of change of delta for every unit change in the underlying price.
   3 Theta=rate of decline in the value of options due to passage of time.
   4 Vega=amount that an option price changes in reaction to 1% change in implied volatility of underlying asset.
   5 Rho=rate at which the price of derivative changes relative to change in risk free rate of interest.
   6 Volatility=it reflects market sentiment and uncertainty. High volatility indicates more significant price swings and higher potential returns (or losses), whereas low volatility suggests more stable prices.

   Practical observation:

> Option greeks and volatility helps in risk management, helps in predicting the option price with the help of various factors. Also helps in predicting profit and loss outcomes.
> Delta represent probability that option contract expire in-the-money
  It changes rapidly for ATM option and slowly for ITM and OTM option
> Gamma represent curvature of option(2nd derivative)
  ATM has highest gamma
> Theta represent time decay aspect
> Rho increases as time to expiration approaches

Utilising the Greeks alongside volatility measures allows traders to tailor strategies to current market conditions, enhancing the effectiveness and precision of their trades.