Q10) Consider a stock whose value S(t) follows sde

$$dS = r \cdot S \, dt + \sigma S \, dw$$ and has a current price a S(0). What is the probability the call option is in the money based on a strike price $K = 1.25 \, S(0)$ at time of expiration T? Given that $T = 0.5$, $r = 0.04$ and $\sigma = 0.10$

Ans) We can see that above standard differential Equation (SDE) follows a geometric brownian motion

$$\mu = \frac{\ln\left(\frac{S(0)}{K}\right) + \left(\mu - \frac{\sigma^2}{2}\right)T}{\sigma\sqrt{T}}$$

$$= \frac{\ln S(0)}{\ldots}$$

$$= -2.908$$

Probability of call option $= 1 - N_c(-2.908)$

$$= 0.998$$

Hence $\boxed{\text{solution (Probability)} = 0.998}$