

1. Consider an asset which follows a geometric Brownian motion (GBM) with drift  $\mu = 10\%$  and volatility  $\sigma = 20\%$ . Assume that the risk free rate is  $r = 5\%$ . The initial asset price at time  $t = 0$  is  $S(0) = 100$ .  
Simulate 10 different paths of the asset price making use of the GBM, in both the real and the risk-neutral worlds.  
Now compute the price of a six month fixed-strike Asian option with a strike price of 105 (using arithmetic average). Do the pricing for both call and put options, using Monte Carlo simulation.  
Repeat the above exercise with strike price  $K = 110$  and  $K = 90$ . How do your results compare ?  
Now do a sensitivity analysis of the option prices.
2. Compute the prices of the Asian options given above by employing variance reduction techniques also and compare your results.