Questions

Write a MATLAB program to solve the SDE: $dX(t) = \lambda X(t)dt + \mu X(t)dW(t)$

The exact solution to this equation: $X(t) = X(0)\exp((\lambda - \mu^2/2))t + \mu W(t)$

a) Write a MATLAB code to solve the above SDE for $\lambda = 2;\ \mu = 1\ \&\ X(0) = 1$ using ***EULAR's method. Compare your results with the exact solution.***

b) Write another MATLAB program to solve the above problem in a Monte Carlo simulation framework (100 simulations) when λ is a uniform random variable between 1.8 to 2.1. ***Compare the ensemble average of X(t) with the exact solution.***

c) Repeat the above MATLAB program when λ and μ realizations of a bivariate normal distribution with mean (2, 1) and standard deviations $\sigma_\lambda = 0.05$ and $\sigma_\mu = 0.02$ with a correlation coefficient $\rho = 0.7$. ***Compare the ensemble average of X(t) with the exact solution.***