Probability and Statistics (UCS410)
Experiment 5
(Continuous Probability Distributions)

1. Consider that X is the time (in minutes) that a person has to wait in order to take a flight. If each flight takes off each hour $X \sim U(0, 60)$. Find the probability that

    (a) waiting time is more than 45 minutes, and
    (b) waiting time lies between 20 and 30 minutes.

2. The time (in hours) required to repair a machine is an exponential distributed random variable with parameter $\lambda = 1/2$.
    (a) Find the value of density function at $x = 3$.
    (b) Plot the graph of exponential probability distribution for $0 \leq x \leq 5$.
    (c) Find the probability that a repair time takes at most 3 hours.
    (d) Plot the graph of cumulative exponential probabilities for $0 \leq x \leq 5$.
    (e) Simulate 1000 exponential distributed random numbers with $\lambda = \frac{1}{2}$ and plot the simulated data.

3. The lifetime of certain equipment is described by a random variable X that follows Gamma distribution with parameters $\alpha = 2$ and $\beta = 1/3$.
    (a) Find the probability that the lifetime of equipment is (i) 3 units of time, and (ii) at least 1 unit of time.
    (b) What is the value of c, if $P(X \leq c) \geq 0.70$? (**Hint:** try quantile function qgamma())