

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  $\lambda = 1/2$  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 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()`)