Probability and Statistics (UCS410)

Experiment 5

(Continuous Probability Distributions)

this question is example of uniform distribution as distribution is uniform in every part of domain (All outcomes are equally likely)

uniform distribution
f(x) = 1/(max-min)

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 ~ U(0, 60). Find the probability that

(60-45)/(60-0) (a) waiting time is more than 45 minutes, and 1-punif(45,0,60)

(30-20)/(60-0) (b) waiting time lies between 20 and 30 minutes. punif(30,0,60)-punif(20,0,60)

2. The time (in hours) required to repair a machine is an exponential distributed random variable with parameter $\lambda = 1/2$.

Exponential function
f(x) = lambda* e^(-lambda*x)

(a) Find the value of density function at x = 3. dexp(3,0.5)

(b) Plot the graph of exponential probability distribution for $0 \le x \le 5$.

first make a vector then put dunif(x,0.5) where x is each iteration of the loop value in vectors and in the end plot the vector

we have been asked to find for atmost 3 hours so use pexp(3,0.5)

(c) Find the probability that a repair time takes at most 3 hours.

(d) Plot the graph of cumulative exponential probabilities for $0 \le x \le 5$.

do the same as second but use pexp this time

(e) Simulate 1000 exponential distributed random numbers with $\lambda = ½$ and plot the simulated data.

use rexp to generate 1000 values and then plotting it using plot(density(rexp (1000,0.5)) as density will frequency of each value

3. The lifetime of certain equipment is described by a random variable X that follows Gamma distribution with parameters $\alpha = 2$ and $\beta = 1/3$.

as atleast 1 unit of time is asked so 1-(pgamma(1,2,1/3))

(a) Find the probability that the lifetime of equipment is at least 1 unit of time.

(b) What is the value of c, if $P(X \le c) \ge 0.70$? (**Hint:** try quantile function qgamma())

qgamma(0.7,2,1/3,lower.tail=FALSE)

in this we will do lower.tail=FALSE and we are calculating for >=