Exercise 01:

Battery life between charges for a certain mobile phone is 20 hours when the primary use is talk time, and drops to 7 hours when the phone is primarily used for internet applications over cellular network. Assume that the battery life in both cases follows an exponential distribution.

a. Show the probability distribution function for battery life for this phone when its primary use is talk time?
b. What is the probability that the battery charge for a randomly selected phone will last no more than 15 hours when its primary use is talk time?
c. What is the probability that the battery charge for a randomly selected phone will last more than 20 hours when its primary use is talk time?
d. What is the probability that the battery charge for a randomly selected phone will last no more than 5 hours its primary use is internet applications?

Exercise 02:

Camcast Corporation is a global telecommunications company headquartered in Philadelphia, generally known for reliable service, the company periodically experiences unexpected service interruptions. When service interruptions do occur, Comcast customers who call the office receive a message providing an estimate of when service will be restored. Suppose that for a particular outage, Comcast customers are told that the service will be restored in two hours. Assume the two hours is the mean time to do the repair and the repair time has an exponential probability distribution.

1- What is the probability that the cable service will be repaired in one hour or less?
2- What is the probability that the repair will take between one hour and two hours?
3- For a customer who calls the Camcast office at 1:00 pm, what is the probability that the cable service will not be restored by 5:00 pm?

Exercise 03:

A fire department receives 911 calls at a mean rate of 1.6 calls per hour. Suppose the number of calls per hour follows a Poisson probability distribution.

1. What is the mean time between 911 calls to the fire department in minutes?
2. Using the mean in part 1, show the probability density function for the time between 911 calls in minutes

3. What is the probability that there will be less than one hour between 911 calls?
4. What is the probability that there will be 30 minutes or more between 911 calls?

Exercise 04:

Let χ a random variable that follows χ^2.

a. Find the following probabilities when the degrees of freedom k= 10

$$p(\chi > 6.74)$$

$$p(\chi < 5)$$

b. Find the critical chi-square values $\chi^2_{p,k}$ for the following for K= 17:

- $\mathrm{p}(\chi < \chi^2_{p,k}) = 0.95$
- $\mathrm{p}(\chi < \chi^2_{p,k}) = 0.05$

Exercise 05:

Let T a random variable follows t-distribution with k degrees of freedom:

1- find the critical *t*-values that have the following probabilities.
$p(T < t) = 0.05$ when k=10, 25, 120. Find the z value $p(z < a) = 0.05$
What observation can you make?

$p(T < t) = 0.975\ when\ k = 10, 25, 120$. Find the z value $p(z < a) = 0.975$

What observation can you make?

2- find probabilities for the following *t*-values

- $p(T < 1.37)\ for\ k = 10$
- $p(T < 2.9)\ for\ k = 8$
- $p(T < 2.02)\ for\ k = 5$
- $p(T > 2.36)\ for\ k = 120$

Exercise 06:

If a random variable follows *F*-distribution find the following critical *F*-values:

$F_{0.05,12.10}$ $F_{0.99,30.10}$ $F_{0.99,12.10}$ $F_{0.95,60.120}$