Discussion 8 - Ishita Dutta

Problem 2

(a)

Using a random sample size of 15 (without replacement) from <exe.pop>, find the 95% confidence interval for mu, and check if the true mean was within the confidence interval. You should return a TRUE or FALSE (or a 1 or 0).

```
mu = 5
exp.pop = rexp(1000000,1/mu)
```

```
sample_2 = sample(exp.pop,15,replace = FALSE)
s1 = t.test(x=sample_2,mu=5,conf.level = 0.95)
s1$conf.int
```

```
## [1] 2.730325 9.069266
## attr(,"conf.level")
## [1] 0.95
```

```
mu > s1$conf.int[1] & mu < s1$conf.int[2]
```

```
## [1] TRUE
```

(b)

Repeat (a) 10000 times, so that you should have a vector of 10000 TRUE's or FALSE's depending on if the true mean was within in confidence interval or not.Use the function <table()> on your vector and display the results.

```
repetitions = 10000
store_results = c()
for(i in 1:repetitions){
  sample_1 = sample(exp.pop,15,replace = FALSE)
  s1 = t.test(x=sample_1,mu=5,conf.level = 0.95)
  store_results[i] = mu > s1$conf.int[1] & mu < s1$conf.int[2]
}

table(store_results)
```

```
## store_results
## FALSE  TRUE
##   869  9131
```

(c)

Find the coverage probability based on (b).

```
mean(store_results)
```

```
## [1] 0.9131
```

(d)

Did this confidence interval have at least a 95% coverage probability? Explain why it did, or why it may not have.

Solution: This interval does not have a 95% coverage probability because our distribution is not a normal distribution, it is an exponential distribution, which is not symmetric so we cannot assume a 95% coverage probability. The coverage probability is 0.9114.