Formative Assessment 7

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2024-02-29

1. In Example 16.3 with λ = 4 per minute, use R to obtain:

- a. P(T ≤ 0.25) = P(time between submissions is at most 15 seconds);

```
ave = 4
pexp(0.25, ave)
```

```
## [1] 0.6321206
```

- b. P(T > 0.5) = P(time between submissions is greater than 30 seconds);

```
1 - pexp(0.5, ave)
```

```
## [1] 0.1353353
```

- c. P(0.25 < T < 1) = P(time between submissions is between 15 seconds and 1 minute).

```
pexp(1, ave) - pexp(0.25, ave)
```

```
## [1] 0.3495638
```

3. The average rate of job submissions in a computer center is 2 per minute. If it can be assumed that the number of submissions per minute has a Poisson distribution, calculate the probability that:

- a. more than two jobs will arrive in a minute;

```
ave <- 2
morethan2 <- 1 - sum(dpois(0:2, ave))
print(paste("Probability of more than two jobs arriving in a minute:", morethan2))
```

```
## [1] "Probability of more than two jobs arriving in a minute: 0.323323583816936"
```

- b. at least 30 seconds will elapse between any two jobs;
  P(T ≥ 0.5)= P(time between submissions is at least 30 seconds)

```
1 - pexp(0.5, ave)
```

```
## [1] 0.3678794
```

- c. less than 30 seconds will elapse between jobs;
  P(T < 0.5)= P(time between submissions is less than 30 seconds)

```
pexp(0.5, ave)
```

```
## [1] 0.6321206
```

- d. a job will arrive in the next 30 seconds, if no jobs have arrived in the last 30 seconds.
  P(0.5 ≤ T ≤ 1)= P(time between submissions is in between of 30 and 60 seconds)

```
pexp(1, ave) - pexp(0.5, ave)
```

```
## [1] 0.2325442
```

7. A website receives an average of 15 visits per hour, which arrive following a Poisson distribution.

- a. Calculate the probability that at least 10 minutes will elapse without a visit.
  10 minutes is 0.16666667 of an hour
  P(0.16666667 ≤ T)= P(time between visits is at least 10 minutes)

```
ave = 15
pexp(0.16666667, ave)
```

```
## [1] 0.917915
```

- b. What is the probability that in any hour, there will be less than eight visits?
  P(X < 8)= P(less than eight visits)

```
ppois(7, ave)
```

```
## [1] 0.01800219
```

- c. Suppose that 15 minutes have elapsed since the last visit, what is the probability that a visit will occur in the next 15 minutes.
  P(0.25 < T ≤ 0.5)= P(time between visits is between 15 and 30 minutes)

```
 pexp(0.5, ave) - pexp(0.25, ave)
```

```
## [1] 0.02296466
```

- d. Calculate the top quartile, and explain what it means

```
qpois(0.75, ave)
```

```
## [1] 18
```