Lab 4: Exploring the Poisson Probability Distribution

75694189 16257626 13341225

Chen Wang, Junke Wang, Zhuozhi Xiong

due: Oct 23, 2019 5:00 pm

Poisson Distributions

Functions: `dpois()`, `ppois()`, `qpois()`, `rpois()`

You run a computer server that services a local message board. Records indicate that messages arrive to the server at a rate of 6 per hour.

For each question below, write the code, then the text answer.

1. What is the expected value of this distribution? What is the variance?

In this question, lambda = 6/hour. And the expected value will be E(x) = lambda = 6 per hour.

Var(X) = lambda = 6 per hour^2.

2. What is the probability that, in the next hour, the server will receive exactly 5 messages?

```
dpois(x = 5, lambda = 6)
```

```
## [1] 0.1606231
```

P(X=5) = 0.16

3. What is the probability that the server will receive no more than 10 messages but at least 5 messages in the next 2 hours?

For two hours, the new lambda will be 6 * 2 = 12/two hours.

```
dpois(x = 5, lambda = 12) + dpois(x = 6,lambda = 12) + dpois(x = 7, lambda = 12) +
  dpois(x = 8, lambda = 12) + dpois(x = 9, lambda = 12) + dpois(x = 10, lambda = 12)
```

```
## [1] 0.339629
```

$P(5<=X<=10) = 0.34$

4. What is the probability that, in the next 3 hours, the server will receive exactly 10 messages?

For the next 3 hours, the new lambda will be 6 * 3 = 18/three hours.

```
dpois(x = 10, lambda = 18)
```

```
## [1] 0.01498516
```

$P(X=10) = 0.01$

5. One of your friends says that there is only a 13% chance that the server will receive more than 8 messages in an hour. Are the correct? Why?

```
1 - ppois(q = 8, lambda = 6)
```

```
## [1] 0.1527625
```

This is not true. Because $P(X>8) = 0.15$