

FA6

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2024-02-22

Question (1)

I. Geometric Distribution. Provide an R code for the geometric distribution. The geometric distribution is a probability distribution that models the number of trials required to achieve the first success in a sequence of Bernoulli trials, where each trial has a constant probability of success.

1. Set the probability of success: $p <- 0.2$
2. Generate 1000 random variables from the geometric distribution.
3. Calculate some basic statistics:

```
mean_x <- mean(x)
```

```
var_x <- var(x)
```

```
sd_x <- sd(x)
```

 4. Print the results in item 3 with the following output (string):

Number of trials required to achieve first success:

Mean (in 2 decimal places):

Variance (in 2 decimal places):

Standard deviation (in 2 decimal places):

5. Plot the histogram of the results.

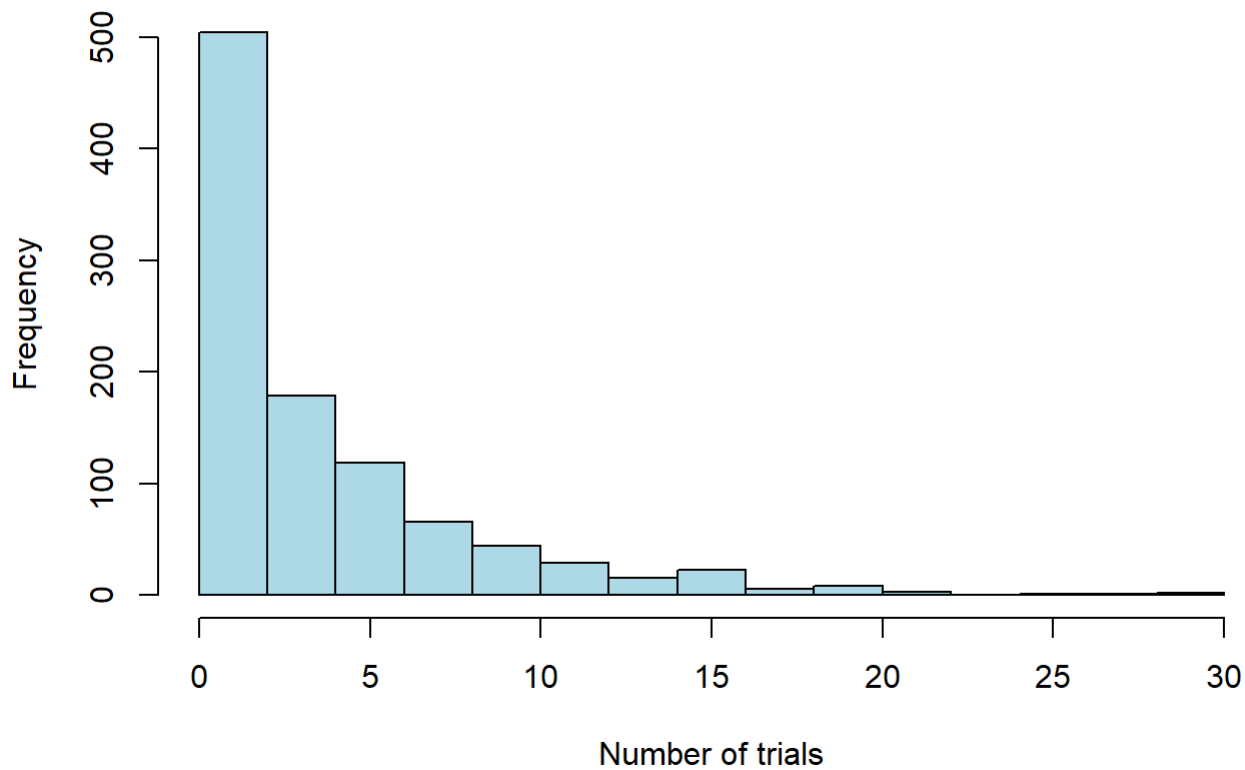
```
## Number of trials required to achieve first success:
```

```
## Mean (in 2 decimal places):  3.94
```

```
## Variance (in 2 decimal places):  20.05
```

```
## Standard deviation (in 2 decimal places):  4.48
```

Histogram of Geometric Distribution



Question (2)

II. Hypergeometric Distribution. Consider a plant manufacturing IC chips of which 10% are expected to be defective. The chips are packed in boxes for export. Before transportation, a sample is drawn from each box. Estimate the probability that the sample contains more than 10% defectives, when:

- 1.) A sample of 10 is selected from a box of 40;
- 2.) A sample of 10 is selected from a box of 5000.

```
## Probability of more than 10% defectives in Scenario 1: 0.7001
```

```
## Probability of more than 10% defectives in Scenario 2: 0.6517
```