SEC-1-FA6-GROUP-1-SIGUE,-JP-FA6

Github: https://github.com/PatrickSigue/APM1110/blob/main/FA6/SEC-1-FA6-GROUP-1-SIGUE%2C-JP-FA6.md

Sigue, John Patrick A.

2025-03-05

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

```
p <- 0.2
```

2. Generate 1000 random variables from the geometric distribution.

```
x <- rgeom(1000, p)
```

3. Calculate some basic statistics: mean_x <- mean(x), var_x <- var(x), sd_x <- sd(x)

```
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)

```
cat("Number of trials required to achieve first success:\n")
```

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

```
cat("Mean:", round(mean_x, 2))
```

```
## Mean: 4.24
```

```
cat("\nVariance:", round(var_x, 2))
```

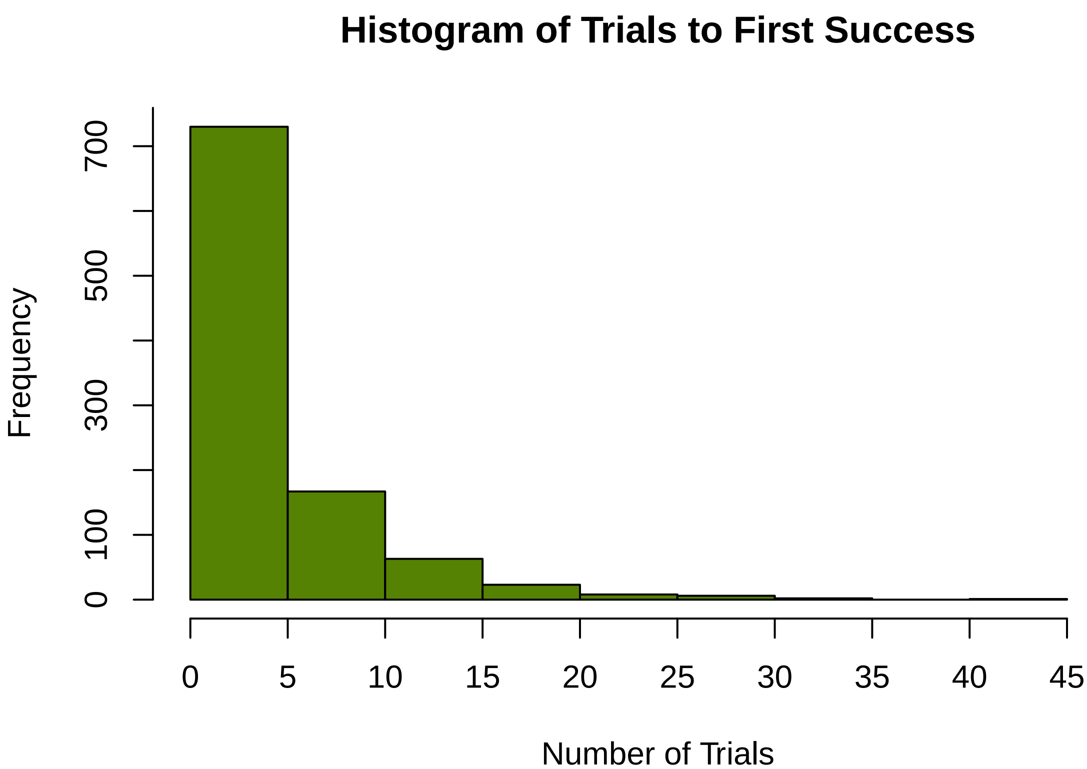
```
##
## Variance: 25.86
```

```
cat("\nStandard Deviation:", round(sd_x, 2))
```

```
##
## Standard Deviation: 5.08
```

5. Plot the histogram of the results.

```
hist(x, main = "Histogram of Trials to First Success", xlab = "Number of Trials",
    col = "#568203", xlim = c(0, max(x) + 5), xaxt = "n", yaxt = "n")
axis(side = 1, at = seq(0, max(x) + 5, by = 5))
axis(side = 2, at = seq(0, 800, by = 100))
```



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

```
q <- 1  #10%
k <- 10  #sample
m <- 40 * 0.1  #10% of 40 - defective
```

```r
n <- 40 * 0.9  #90% of 40 - non defective

ans <- round(phyper(q, m, n, k), 4)
cat("Probability that the sample contains more than 10% defectives: ", ans *
    100, "%", sep = "")
```

```
## Probability that the sample contains more than 10% defectives: 74.41%
```

2. A sample of 10 is selected from a box of 5000

```r
q <- 1  #10%
k <- 10  #sample
m <- 5000 * 0.1  #10% of 5000 - defective
n <- 5000 * 0.9  #90% of 5000 - non defective

ans <- round(phyper(q, m, n, k), 4)
cat("Probability that the sample contains more than 10% defectives: ", ans *
    100, "%", sep = "")
```

```
## Probability that the sample contains more than 10% defectives: 73.61%
```