SEC 1-FA6 GROUP 7 - DELA ROSA, R

GitHub Link:(https://github.com/rddelarosa/APM1110/blob/main/FA6/SEC_1-FA6_GROUP_7-DELA-ROSA%2C-R.md?plain=1)

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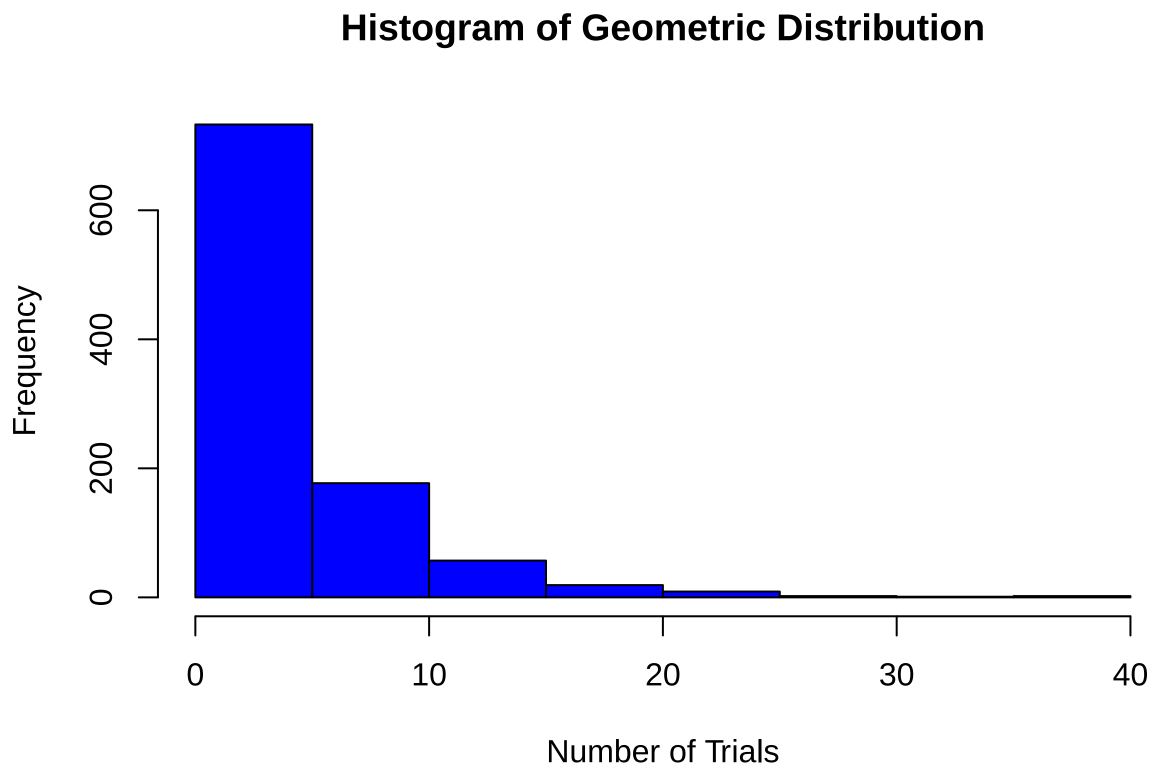
I. Geometric Distribution. Provide an R code for the geometric distribution. The geometric distribution is a probability distribution that models the number of trials required to achieve the first success in a sequence of Bernoulli trials, where each trial has a constant probability of success.

1. Set the probability of success: `p <- 0.2`
2. Generate 1000 random variables from the geometric distribution.
3. Calculate basic statistics:
   - `mean_x <- mean(x)`
   - `var_x <- var(x)`
   - `sd_x <- sd(x)`
4. Print the results with the following format:
   - 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.

```r
# Set probability of success
p <- 0.2

# Generate 1000 random variables from geometric distribution
x <- rgeom(1000, p)

# Calculate statistics
mean_x <- mean(x)
var_x <- var(x)
sd_x <- sd(x)

# Print results
cat("Number of trials required to achieve first success:\n Mean (in 2 decimal places):", round(mean_x, 2
```

```
## Number of trials required to achieve first success:
##  Mean (in 2 decimal places): 4.12
##  Variance (in 2 decimal places): 22.95
##  Standard deviation (in 2 decimal places): 4.79
```

```
# Plot histogram
hist(x, col = "blue", main = "Histogram of Geometric Distribution", xlab = "Number of Trials", ylab = "F
```



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.

```
# Case 1: Sample of 10 from a box of 40
N <- 40    # Population
K <- 10    # Sample size
m <- round(N * 0.1)  # Total defective items
n <- N - m  # Total non-defective items
x <- ceiling(K * 0.1) + 1  # More than 10% defectives in the sample

# Calculate probability
p_case1 <- sum(dhyper(x:K, m, n, K))
cat("Probability of more than 10% defectives in a box of 40 with 10 sampled:",p_case1,"or", round((100*p
```

```
## Probability of more than 10% defectives in a box of 40 with 10 sampled: 0.2558814 or 25.59 %
```

```r
# Case 2: Sample of 10 from a box of 5000
N <- 5000  # Population
K <- 10    # Sample size
m <- round(N * 0.1)  # Total defective items
n <- N - m  # Total non-defective items
x <- ceiling(K * 0.1) + 1  # More than 10% defectives in the sample

# Calculate probability
p_case2 <- sum(dhyper(x:K, m, n, K))
cat("Probability of more than 10% defectives in a box of 5000 with 10 sampled:",p_case2,"or",round((100
```

```
## Probability of more than 10% defectives in a box of 5000 with 10 sampled: 0.2638622 or 26.39 %
```