FA6 No 2

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2025-03-05

II. Hypergeometric Distribution

We need to find

$$P(X > 1) = 1 - P(X = 0) - P(X = 1)$$

For both cases, we will follow the Hypergeometric Probability formula:

$$P(X = k) = \frac{\binom{K}{k}\binom{N-K}{n-k}}{\binom{N}{n}}$$

Case 1: A sample of 10 is selected from a box of 40

Insert values into variables

```
# k = selected number of defective chips
k1 <- 0.10
# n = sample size
n1 <- 10
# N = population from given case
N1 <- 40
# K = defective
K1 <- N1*k1

# Compute the probabilities P(X = 0) and P(X = 1)
P_X0_case1 <- dhyper(x = 0, m = K1, n = N1 - K1, k = n1)
P_X1_case1 <- dhyper(x = 1, m = K1, n = N1 - K1, k = n1)

# Compute P(X > 1) = 1 - P(X = 0) - P(X = 1)
P_greater1_case1 <- 1 - P_X0_case1 - P_X1_case1
```

We get that the probability that the sample contains more that 10% defectives when a sample of 10 is selected from a box of 40 is **25.59%**

Case 2: A sample of 10 is selected from a box of 5000

Insert values into variables

```r
# k = selected number of defective chips
k2 <- 0.10
# n = sample size
n2 <- 10
# N = population from given case
N2 <- 5000
# K = defective
K2 <- N2*k2

# Compute the probabilities P(X = 0) and P(X = 1)
P_X0_case2 <- dhyper(x = 0, m = K2, n = N2 - K2, k = n2)
P_X1_case2 <- dhyper(x = 1, m = K2, n = N2 - K2, k = n2)

# Compute P(X > 1) = 1 - P(X = 0) - P(X = 1)
P_greater1_case2 <- 1 - P_X0_case2 - P_X1_case2
```

We get that the probability that the sample contains more that 10% defectives when a sample of 10 is selected from a box of 5000 is **26.39%**