Stat 345 Solutions - Section 3.8

$\underline{\text{Problem 3-86}}$

The pmf of X is

$$f(x) = \frac{\binom{20}{x}\binom{80}{4-x}}{\binom{100}{4}}, \ x = 0, 1, 2, 3, 4$$

(a)

$$P(X = 1) = \frac{\binom{20}{1}\binom{80}{4-1}}{\binom{100}{4}} = 0.4191$$

(b) P(X = 6) = 0(c)

$$P(X = 4) = \frac{\binom{20}{4}\binom{80}{4-4}}{\binom{100}{4}} = 0.0012$$

(d)
$$\mu = n(\frac{K}{N}) = 4(20/100) = 0.8$$

 $\sigma^2 = n(\frac{K}{N})(1 - \frac{K}{N})(\frac{N-n}{N-1}) = 4(20/100)(1 - 20/100)((100 - 4)/(100 - 1)) = 0.6206$

 $\underline{\text{Problem 3-88}}$

The pmf of X is

$$f(x) = \frac{\binom{4}{x}\binom{6}{3-x}}{\binom{10}{3}}, \ x = 0, 1, 2, 3$$

Using this expression, the probabilities assigned to each outcome are: P(X = 0) = 0.167 P(X = 1) = 0.5 P(X = 2) = 0.3P(X = 3) = 0.033



 $\underline{\text{Problem 3-89}}$

The cdf is

$$F(x) = \begin{cases} 0 & x < 0\\ 0.167 & 0 \le x < 1\\ 0.667 & 1 \le x < 2\\ 0.967 & 2 \le x < 3\\ 1 & x \ge 3 \end{cases}$$

$\underline{\text{Problem 3-90}}$

Let the random variable X be the number of unacceptable washers in the sample. Then X has a hypergeometric distribution with N = 75, n = 10, and K = 5.

The pmf of X is

$$f(x) = \frac{\binom{5}{x}\binom{70}{10-x}}{\binom{75}{10}}, \quad x = 0, 1, 2, 3, 4, 5$$

(a)

$$P(X = 0) = \frac{\binom{5}{0}\binom{70}{10-0}}{\binom{75}{10}} = 0.4786$$

(b)

$$P(X \ge 1) = 1 - P(X < 1)$$

= 1 - P(X = 0)
= 1 - 0.4786
= 0.5214

(c)

$$P(X = 1) = \frac{\binom{5}{1}\binom{70}{10-1}}{\binom{75}{10}} = 0.3923$$

(d) $\mu = 10(5/75) = 0.667$