Solution to Assignment No.2

3-52 The range of Y is 0, 5, 10, ..., 45, E(X) = (0+9)/2 = 4.5

E(Y) = 0(1/10)+5(1/10)+...+45(1/10)

= 5[0(0.1) +1(0.1)+ ... +9(0.1)]

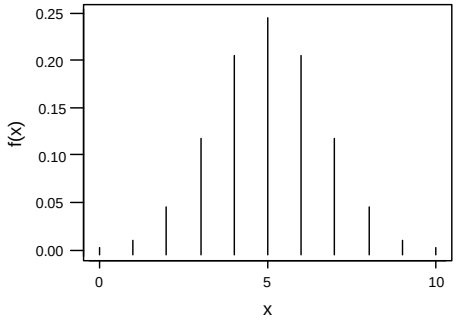
= 5E(X)

= 5(4.5)

= 22.5

V(X) = 8.25, V(Y) = 5^2(8.25) = 206.25, σ_Y = 14.36

3-56



a.) $E(X) = np = 10(0.5) = 5$

b.) Values X=0 and X=10 are the least likely, the extreme values

3-64 Let X denote the number of times the line is occupied. Then, X has a binomial distribution with n = 10 and p = 0.4

a.) P(X = 3) = $\binom{10}{3}0.4^3(0.6)^7 = 0.215$

b.) $P(X \geq 1) = 1 - P(X = 0) = 1 - \binom{10}{0}0.4^0 0.6^{10} = 0.994$

c.) $E(X) = 10(0.4) = 4$

3-73. Let X denote the number of trials to obtain the first successful alignment. Then X is a geometric random variable with p = 0.8

a) $P(X = 4) = (1-0.8)^3 0.8 = 0.2^3 0.8 = 0.0064$

b) $P(X \leq 4) = P(X = 1) + P(X = 2) + P(X = 3) + P(X = 4)$

$= (1-0.8)^0 0.8 + (1-0.8)^1 0.8 + (1-0.8)^2 0.8 + (1-0.8)^3 0.8$

$= 0.8 + 0.2(0.8) + 0.2^2(0.8) + 0.2^3 0.8 = 0.9984$

c) $P(X \geq 4) = 1 - P(X \leq 3) = 1 - [P(X = 1) + P(X = 2) + P(X = 3)]$

$= 1 - [(1-0.8)^0 0.8 + (1-0.8)^1 0.8 + (1-0.8)^2 0.8]$

$= 1 - [0.8 + 0.2(0.8) + 0.2^2(0.8)] = 1 - 0.992 = 0.008$

3-77 p = 0.005 , r = 8

a.) $P(X = 8) = 0.005^8 = 3.91x10^{-19}$

b). $\mu = E(X) = \dfrac{1}{0.005} = 200$ days

c) Mean number of days until all 8 computers fail. Now we use p=3.91x10^{-19}

$\mu = E(Y) = \dfrac{1}{3.91x10^{-91}} = 2.56x10^{18}$ days or 7.01 x10^{15} years