Assignment 2

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Question: Determine the binomial distribution where mean is 9 and standard deviation is $\frac{3}{2}$ Also, find the probability of obtaining at most one success.

Solution: For binomial distribution :
Given, Mean = 9 and Standard Deviation(S.D) = $\frac{3}{2}$

$$Mean = np = 9 \tag{1}$$

$$Variance = (S.D.)^2 = npq = \frac{9}{4} \tag{2}$$

By substituting equation(1) in equation(2) :

$$q = \frac{1}{4} \tag{3}$$

Since, p = $1 - q$

$$p = 1 - \frac{1}{4} = \frac{3}{4} \tag{4}$$

Using equation (4) in equation (1)

$$n = \frac{9}{p} = \frac{4 * 9}{3} = 12 \tag{5}$$

-Thus Binomial distribution is:

$$P(x = r) = {}^{12}C_r(\frac{3}{4})^r(\frac{1}{4})^{12-r}$$

r = $0, 1, 2, 3...$

- P(at most one success) = P(x=0) + P(x=1)

$$= {}^{12}C_0(\frac{3}{4})^0(\frac{1}{4})^{12} + {}^{12}C_1(\frac{3}{4})^1(\frac{1}{4})^{11}$$
$$= (\frac{1}{12})^{12} + 36(\frac{1}{12})^{12} = \frac{37}{4^{12}}$$