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 ...*(I)*

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

By substituting equation (I) in equation (II), q = $\frac{1}{4}$

Since, p = $1 - q$

p = 1 - $\frac{1}{4}$ = $\frac{3}{4}$ ...*(*III)

Using eqn (III) in eqn (I)

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

- **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)

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

= $(\frac{1}{12})^{12} + 36(\frac{1}{12}{}^{12}) = \frac{37}{4^{12}}$