Assignment

EE23010: Probability and Random Processes
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Question: If X follows binomial distribution with parameters $n = 5$, p and

$$p_X(2) = 9p_X(3) \tag{1}$$

then p is ?

Solution:

Given, X follows binomial distribution and pmf of X is:

$$p_X(k) = {}^nC_k p^k (1-p)^{n-k} \tag{2}$$

We have, $n = 5$ and p as parameters.
So,

$$p_X(2) = {}^5C_2 p^2 (1-p)^3 \tag{3}$$
$$p_X(3) = {}^5C_3 p^3 (1-p)^2 \tag{4}$$

Now, using eqn (1)

$${}^5C_2 p^2 (1-p)^3 = 9\left[{}^5C_3 p^3 (1-p)^2\right] \tag{5}$$
$$(1-p) = 9p \tag{6}$$
$$\implies p = \frac{1}{10} \tag{7}$$