Assignment-1

CS22BTECH11006

12.13.5.15 Question : The probability that a student is not a swimmer is $\frac{1}{5}$ .Then the probability that out of five students, four are swimmers

1) ${}^5C_4 \left(\frac{4}{5}\right)^4 \frac{1}{5}$

2) $\left(\frac{4}{5}\right)^4 \frac{1}{5}$

3) ${}^5C_1 \frac{1}{5} \left(\frac{4}{5}\right)^4$

4) None of these

Solution:

X : be number of swimmers

As picking a student is Bernoulli trial

So, X has binomial distribution

$$P_X(k) = {}^nC_k p^k q^{n-k} \tag{1}$$

Given,

$n = 5$

probability that student is not swimmer is $\frac{1}{5}$

So,

$$q = \frac{1}{5} \tag{2}$$

$$p = 1 - q = \frac{4}{5} \tag{3}$$

Probability that out of five students, four are swimmers is $\Pr(X = 4)$

$$P_X(4) = {}^5C_4 \left(\frac{4}{5}\right)^4 \left(\frac{1}{5}\right)^{5-4} \tag{4}$$

$$= {}^5C_4 \left(\frac{4}{5}\right)^4 \frac{1}{5} \tag{5}$$

$$= {}^5C_1 \frac{1}{5} \left(\frac{4}{5}\right)^4 \quad \left({}^5C_4 = {}^5C_1\right) \tag{6}$$

Hence, option 1 and 2 both are correct