Assignment 1

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Q49

Given 30 questions in a multiple choice exam. Given 3 candidates A,B and C. All of them have to mark only one answer to every question. Each student marks the answer randomly and independently. We need to find the probability that all three students match each other perfectly.

Let every question have 4 options - a,b,c,d

Probability that A marks option a) is 1/4 (Given random process)

$$P(A = a) = 1/4 \tag{1}$$

$$\Rightarrow P((A = a) \cap (B = a) \cap (C = a)) = P(A = a) * P(B = a) * P(C = a) = \frac{1}{4} * \frac{1}{4} * \frac{1}{4} \tag{2}$$

But there are 4 options that can be marked by students - a,b,c,d. Thus the probability that all students mark same option is -

P(All students mark same for one question) =

$$q = (\frac{1}{4} * \frac{1}{4} * \frac{1}{4}) * 4 = \frac{1}{16} \tag{3}$$

There are total 30 questions. Thus, the probability(p) that all students mark same for all questions is -

$$p = q^{30} = \frac{1}{16^{30}} = 4^{-60} \tag{4}$$