Assignment 1

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Q49) There are 30 questions in a certain multiple choice examination paper. Each question has 4 options and exactly one is to be marked by the candidate. Three candidates A,B,C mark each of the 30 questions at random independently. The probability that all the 30 answers of the three students match each other perfectly is?

Ans 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 -

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