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Probability Assignment-1

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I. PROBLEM

Out of 100 students, two sections of 40 and 60 are formed. If you and your friend are among the 100 students, what is the probability that
(a) you both enter the same section?
(b) you both enter the different sections?

II. SOLUTION

Given,
Total number of students = 100
Number of students in section A = 40
Number of students in section B = 60

(a)both enter the same section

P(both enter section A) = P(A) = $\frac{^{40}C_2}{^{100}C_2}$
P(both enter section B) = P(B) = $\frac{^{60}C_2}{^{100}C_2}$

Probability that two students enter same section,

$$P(\text{same section}) = P(A+B)$$
$$P(A+B) = P(A)+P(B)$$
$$P(A+B) = \frac{^{40}C_2}{^{100}C_2}+\frac{^{60}C_2}{^{100}C_2} = \frac{156}{990}+\frac{354}{990}$$
$$P(A+B) = \frac{17}{33}$$

(b)both enter different section

$$P(\text{not same section}) = P((A+B)')$$
$$P((A+B)') = 1-P(A+B)$$
$$P((A+B)') = 1-\frac{17}{33}$$
$$P((A+B)') = \frac{16}{33}$$