Assignment 2

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and latex-tikz codes from

1 QUESTION

(GATE MA 1999 Q1.28) Two independent events E and F are such that $P(E \cap F) = \dfrac{1}{6}, P(E^c \cap F^c) = \dfrac{1}{3}$ and $P(E) > P(F)$. Then $P(E)$ is

(A) $\dfrac{1}{2}$

(B) $\dfrac{2}{3}$

(C) $\dfrac{1}{3}$

(D) $\dfrac{1}{4}$

2 SOLUTION

If E and F are independent

$$P(E \cap F) = P(E)P(F)$$
$$= \frac{1}{6} \qquad (2.0.1)$$

We know

$$P(E) + P(F) - P(E \cap F) = 1 - P(E^c \cap F^c)$$
$$P(E) + P(F) = \frac{5}{6} \qquad (2.0.2)$$

From (2.0.1) and (2.0.2)

$$P(E)\left(\frac{5}{6} - P(E)\right) = \frac{1}{6} \qquad (2.0.3)$$

$$P(E) = \frac{1}{2} \text{ or } \frac{1}{3} \qquad (2.0.4)$$

From (2.0.2), $P(E) = \frac{1}{2}$ satisfies $P(E) > P(F)$ while $P(E) = \frac{1}{3}$ does not.

$\therefore P(E) = \frac{1}{2}$

Solution: option (A)