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1.3.2 Examples of Conditional Probability:-

EXAMPLE:- Roll a die; let A = {score an even number} and B = {score a number >= 3}. Find P(A|B) and P(B|A).

⇒ From above:

$A = \{2, 4, 6\}$

$B = \{3, 4, 5, 6\}$

$A \cap B = \{4, 6\}$

$\therefore P(A) = \frac{3}{6} = 1/2 = 0.5$

$\therefore P(B) = 4/6 = 2/3 = 0.67$

$\therefore P(A \cap B) = P(B \cap A) = 2/6 = 1/3$

$\therefore P(A|B) = \frac{P(A \cap B)}{P(B)} = \frac{1/3}{2/3} = \frac{1}{2}$

$\therefore P(B|A) = \frac{P(A \cap B)}{P(A)} = \frac{1/3}{1/2} = \frac{2}{3}$

GATE-2003: Let P(E) denote the probability of the Event E. Given P(A) = 1, P(B) = 1/2, the values of P(A|B) and P(B|A) respectively are:

(A) 1/4, 1/2 (B) 1/2, 1/4

(C) 1/2, 1 (D) 1, 1/2

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⇒ As from above question, $P(A) = 1$; it means A is a whole sample-space.

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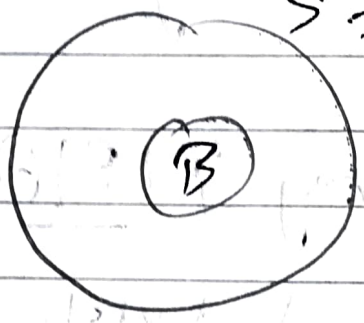

$\Rightarrow A \cap B = B$

$\therefore P(A \cap B) = P(B) = 1/2$

$\therefore P(A|B) = \frac{P(A \cap B)}{P(B)} = \frac{1/2}{1/2} = \frac{1}{1}$

$\therefore P(B|A) = \frac{P(A \cap B)}{P(A)} = \frac{1/2}{1} = \frac{1/2}{2}$