CO**n**CEPTUAL   TOOLS

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PROBABILITY
CONDITIONAL PROBABILITY
Discrete random variables
EXAMPLE 3

EX: Given $P(B, C) = 0.4$, $P(B, C \mid A) = 0.8$, $P(A \mid B, C) = 0.6$. Find $P(A)$.

SOL'N: The following formula defines conditional probability:

$$P(A \mid B) = \frac{P(A,B)}{P(B)}$$

We can solve for $P(A)$ by rearranging this equation and using various events in place of A and B.

$$P(B,C \mid A) = \frac{P(A,B,C)}{P(A)}$$

or

$$P(A) = \frac{P(A,B,C)}{P(B,C \mid A)} = \frac{P(A \mid B,C)P(B,C)}{P(B,C \mid A)} = \frac{0.6(0.4)}{0.8} = 0.3$$