

Assignment 1

Probability & Random Variables

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Question: Compute $P(A|B)$, if $P(B) = 0.5$ and $P(A \cap B) = 0.32$.

Solution: To compute $P(A|B)$, we can apply Bayes' theorem. Bayes' theorem states:

$$P(A|B) = \frac{P(B|A) \cdot P(A)}{P(B)}$$

Given that $P(B) = 0.5$ and $P(A \cap B) = 0.32$, we need to find $P(A)$ and $P(B|A)$ to substitute into the formula.

First, let's find $P(A)$. We can use the formula:

$$P(A) = \frac{P(A \cap B)}{P(B)}$$

Substituting the given values, we have:

$$P(A) = \frac{0.32}{0.5} = 0.64$$

Next, let's find $P(B|A)$. We can use the formula:

$$P(B|A) = \frac{P(A \cap B)}{P(A)}$$

Substituting the given values, we have:

$$P(B|A) = \frac{0.32}{0.64} = 0.5$$

Finally, we can substitute these values into Bayes' theorem to find $P(A|B)$:

$$P(A|B) = \frac{P(B|A) \cdot P(A)}{P(B)} = \frac{0.5 \cdot 0.64}{0.5} = 0.64$$

Therefore, $P(A|B) = 0.64$.