

Probability&RV

Assignment-07

Anuradha U-ee21resch01008

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https://github.com/Anuradha-Uggi/Assignments-AI5002-Probability-and-Random-Variables/blob/main/Prob_ass07/rvsp_7.tex

I. QUESTION(PROB,6.4)

If $P(A/B) > P(A)$, then which of the following is correct :

- A) $P(A \cap B) < P(A)P(B)$
- B) $P(B/A) < P(B)$
- C) $P(B/A) > P(B)$
- D) $P(B/A) = P(B)$

II. SOLUTION

Given

$$P(A/B) > P(A)$$

by expanding conditional probability

$$P(A/B) = \frac{P(A \cap B)}{P(B)} \quad (2)$$

by rewriting the Given condition

$$P(A \cap B) > P(A)P(B) \quad (3)$$

Options Verification:

A) $P(A \cap B) < P(A)P(B)$:

from equation (3) the given option (A) is false.

B) $P(B/A) < P(B)$:

from equation (2) option (B) can be expanded as

$$P(B/A) = \frac{P(B \cap A)}{P(A)} \quad (4)$$

$$P(A \cap B) = P(B \cap A) \quad (5)$$

Now by rewriting Option (B)

$$P(B \cap A) < P(A)P(B) \quad (6)$$

from equation (3) above option is false.

C) $P(B/A) > P(B)$:

by rewriting it

$$P(B \cap A) > P(A)P(B) \quad (7)$$

which is True from equation (3)

D) $P(B/A) = P(B)$:

by rewriting

$$P(B \cap A) = P(A)P(B) \quad (8)$$

which is false as per the given condition.

III. CONCLUSION

By verifying all given options, Option (C) pre-serves the given condition in equation (1)