Probability&RV Assignment-07

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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∩ 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

$$P(A/B) > P(A) \tag{1}$$

by expanding conditional probability

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

by rewriting the Given condition

$$P(A \cap B) > P(A)P(B) \tag{3}$$

Options Verification:

A) P(A∩ 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

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

$$P(A \cap B) = P(B \cap A) \tag{5}$$

Now by rewriting Option (B)

$$P(B \cap A) < P(A)P(B) \tag{6}$$

from equation (3) above option is false.

C) P(B/A) > P(B):
by rewriting it

$$P(B \cap A) > P(A)P(B) \tag{7}$$

which is True from equation (3)

D) P(B/A)= P(B):
by rewriting

$$P(B \cap A) = P(A)P(B) \tag{8}$$

which is false as per the given condition.

III. CONCLUSION

By verifying all given options,Option (C) preserves the given condition in equation (1)