Answer on Question #66916 – Math – Statistics and Probability

Question

A survey was recently done in a certain town to determine readership of newspapers available. 50% of the resident read Daily Nation, 60% read The Standard and 20% read both newspapers. Determine the probability that a resident selected does not read any newspaper.

Solution

Let's denote the events as follows:

$A = \{selected\ resident\ reads\ Daily\ Nation\},$

$B = \{selected\ resident\ reads\ The\ Standard\},$

$C = \{selected\ resident\ does\ not\ read\ any\ newspaper\},$

$A \cap B = \{selected\ resident\ reads\ Daily\ Nation\ and\ The\ Standard\},$

$A \cup B = \{selected\ resident\ reads\ Daily\ Nation\ or\ The\ Standard, or\ both\}.$

The question states that

$$P(A) = 0.5, P(B) = 0.6, P(A \cap B) = 0.2.$$

Now assuming there are only two newspapers in the town, we have

$$P(C) = P(U \backslash (A \cup B)) = P(U) - P(A \cup B) = 1 - P(A \cup B),$$

where U is the universal set, the set of all possible outcomes,

$$P(U) = 1.$$

By the inclusion-exclusion principle,

$$P(A \cup B) = P(A) + P(B) - P(A \cap B).$$

So

$$P(C) = 1 - P(A) - P(B) + P(A \cap B) = 1 - 0.5 - 0.6 + 0.2 = 0.1.$$

Answer: $P(\{selected\ resident\ does\ not\ read\ any\ newspaper\}) = 0.1.$