In a large metropolitan area, the probabilities are .87, .36, .30 that a family (randomly chosen for a sample survey) owns a colour television set, a black and white television set, or both kinds of sets. What is the probability that a family owns either anyone or both kinds of sets?

Solution:

E_1 = Event that a family owns colour television

E_2 = Event that the family owns black and white television

Given that $P(E_1) = 0.87$

$P(E_2) = 0.36$ and $P(E_1 \cap E_2) = 0.30$

Now, we have to find the probability that a family owns either anyone or both kinds of sets.

By General Addition Rule, we have

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

$\therefore P(E_1 \cup E_2) = P(E_1) + P(E_2) - P(E_1 \cap E_2)$

P(required)= 0.87 + 0.36 – 0.30

= 1.23 – 0.30

= 0.93