

Assignment 8

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Outline

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Problem Statement

(NCERT Class 12, Exercise 13.2.16) In a hostel, 60% of the students read Hindi newspaper, 40% read English newspaper and 20% read both Hindi and English newspapers. A student is selected at random.

- Find the probability that she reads neither Hindi nor English newspapers.
- If she reads Hindi newspaper, find the probability that she reads English newspaper.
- If she reads English newspaper, find the probability that she reads Hindi newspaper.

Solution

Events

- 1 E: Student reads English newspaper
- 2 F: Student reads Hindi newspaper

Given

- 1 $\Pr(E) = 0.4$
- 2 $\Pr(F) = 0.6$
- 3 $\Pr(EF) = 0.2$

To find

- 1 $\Pr(E' + F')$
- 2 $\Pr(E|F)$
- 3 $\Pr(F|E)$

1. $\Pr(E' + F')$

Using De-Morgan's Laws,

$$\Pr(E' + F') = \Pr((EF)') \quad (1)$$

$$= 1 - \Pr(EF) \quad (2)$$

$$= 1 - 0.2 = \frac{4}{5} \quad (3)$$

2. $\Pr(E|F)$

$$\Pr(E|F) = \frac{\Pr(EF)}{\Pr(F)} \quad (4)$$

$$= \frac{0.2}{0.6} = \frac{1}{3} \quad (5)$$

3. $\Pr(F|E)$

$$\Pr(F|E) = \frac{\Pr(EF)}{\Pr(E)} \quad (6)$$

$$= \frac{0.2}{0.4} = \frac{1}{2} \quad (7)$$

Answers

① $\Pr(E' + F') = \frac{4}{5}$

② $\Pr(E|F) = \frac{1}{3}$

③ $\Pr(F|E) = \frac{1}{2}$