

Assignment 1

Ncert Exemplar

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I. QUESTION-11.16.3.43

Match the following:

(a) if E_1 and E_2 are the two mutually exclusive events	(i) $E_1 \cap E_2 = E_1$
(b) if E_1 and E_2 are the mutually exclusive and exhaustive events	(ii) $(E_1 - E_2) \cup (E_1 \cap E_2) = E_1$
(c) if E_1 and E_2 have common outcomes, then	(iii) $E_1 \cap E_2 = \phi, E_1 \cup E_2 = S$
(d) if E_1 and E_2 are two events such that $E_1 \subset E_2$	(iv) $E_1 \cap E_2 = \phi$

TABLE 0

Solution:

- 1) If E_1 and E_2 are mutually exclusive events, then $E_1 E_2 = \phi$.
- 2) If E_1 and E_2 are mutually exclusive and exhaustive events, then $E_1 E_2 = \phi$ and $E_1 + E_2 = S$
- 3) If E_1 and E_2 have common outcomes, this means:

$$E_1 E_2 \neq \phi \quad (1)$$

Let E_a be the outcomes that are present in E_1 and not in E_2 . So,

$$E_a = E_1 - E_2 \quad (2)$$

Let E_b be the outcomes common between E_1 and E_2 . So,

$$E_b = E_1 E_2 \quad (3)$$

So, we can say that

$$E_1 = E_a + E_b \quad (4)$$

Referring to equation (2) and (3):

$$E_1 = (E_1 - E_2) + (E_1 E_2) \quad (5)$$

- 4) If E_1 and E_2 are two events such that $E_1 \subset E_2$, then let E be subset of E_2 containing elements other than E_1 . So,

$$E_1 + E = E_2 \text{ and } E_1 E = E_2 \quad (6)$$

Referring to equation (6):

$$E_1 E_2 = E_1 (E_1 + E) \quad (7)$$

$$= (E_1 E_1) + (E_1 E) \quad (8)$$

$$= E_1 \quad (9)$$

Hence,

$$1) \leftrightarrow (iv),$$

$$2) \leftrightarrow (iii),$$

$$3) \leftrightarrow (ii),$$

$$4) \leftrightarrow (i)$$