

# 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:

(a) If  $E_1$  and  $E_2$  are mutually exclusive events, then  $E_1 E_2 = \phi$ .

(b) If  $E_1$  and  $E_2$  are mutually exclusive and exhaustive events, then  $E_1 E_2 = \phi$  and  $E_1 + E_2 = S$

(c) If  $E_1$  and  $E_2$  have common outcomes, this means:

$$E_1 E_2 \neq 0 \quad (1)$$

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

$$E_1 - E_2 = E \text{ and } E_1 E_2 = E_2 \quad (2)$$

$$\therefore E_1 = E + E_2 \quad (3)$$

Referring to equation (2):

$$E_1 = (E_1 - E_2) + (E_1 E_2) \quad (4)$$

(d) 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,

$$E_1 + E = E_2 \text{ and } E_1 E = E_2 \quad (5)$$

Referring to equation (5):

$$E_1 E_2 = E_1 (E_1 + E) \quad (6)$$

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

$$= E_1 \quad (8)$$

Hence,

$(a) \leftrightarrow (iv), (b) \leftrightarrow (iii), (c) \leftrightarrow (ii), (d) \leftrightarrow (i)$