

# AI1110 Assignment-5

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**Abstract**—This document contains the solution for Assignment 5 (NCERT Class 11 Probability Exercise 16.2 Question 4)

**EXERCISE 16.2.4 :** Three coins are tossed once. Let A denote the event 'three heads show', B denote the event 'two heads and one tail show', C denote the event 'three tails show', D denote the event 'a head shows on the first coin'. Which events are

- (i) Mutually exclusive?
- (ii) Simple?
- (iii) Compound?

## Solution:

Three coins are tossed at once we can represent outcome of each coin in random variables as  $X_i \in \{0, 1\}$ ,  $i = 1, 2, 3$  where  $X_i = 0$  denotes occurrence of tail and  $X_i = 1$  denotes occurrence of head.

Event	Description
A	3 Heads
B	2 Heads 1 Tail
C	3 Tails
D	Head on first coin

TABLE I  
EVENTS

Every outcome in the sample space is denoted in the form  $(X_1, X_2, X_3)$ .

The outcomes of events in table (I) are,

$$A = \{(1, 1, 1)\} \quad (1)$$

$$B = \{(1, 1, 0) \cup (1, 0, 1) \cup (0, 1, 1)\} \quad (2)$$

$$C = \{(0, 0, 0)\} \quad (3)$$

$$D = \{(1, 1, 1) \cup (1, 1, 0) \cup (1, 0, 1) \cup (1, 0, 0)\} \quad (4)$$

- (i) Now we observe that,

$$A \cap B = \phi \quad (5)$$

$$A \cap C = \phi \quad (6)$$

$$A \cap D = \{(1, 1, 1)\} \neq \phi \quad (7)$$

$$B \cap C = \phi \quad (8)$$

$$B \cap D = \{(1, 1, 0) \cup (1, 0, 1)\} \neq \phi \quad (9)$$

$$C \cap D = \phi \quad (10)$$

Therefore from above we can say,

Event A and B; Event A and C; Event B and C; and Event C and D are all Mutually exclusive.

- (ii) If an event has only one sample point of a sample space, it is called a **Simple event**.

Thus, A and C are simple events.

- (iii) If an event has more than one sample point of a sample space, it is called a **Compound event**. Thus, B and D are compound events.