

# Assignment-6

## (Papoulis Chapter 4 Example 4.2)

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## Question

In a die roll experiment the six outcomes are denoted as  $f_i$  and for each outcome, a random variable is assigned as  $x(f_i) = 10i$ . Using these find the set of favourable outcomes for each of the conditions given below.

- (i)  $\{x \leq 35\}$
- (ii)  $\{x \leq 5\}$
- (iii)  $\{20 \leq x \leq 35\}$
- (iv)  $\{x = 40\}$
- (v)  $\{x = 35\}$

## Solution

Given that the random variables of the outcomes of a die roll experiment are given as  $x(f_i) = 10i$ , where  $f_i$ ,  $i = 1, 2, \dots, 6$  are the outcomes.

Then for each of the conditions imposed for the random variables, the favourable outcomes set:

## Solution

(i) Given condition,

$$\{x \leq 35\}$$

This can be written as,

$$x(f_i) \leq 35$$

$$10i \leq 35$$

$$i \leq 3.5$$

Then the outcome set would be,

$$A = \{f_1, f_2, f_3\}$$

## Solution

(ii) Given condition,

$$\{x \leq 5\}$$

This can be written as,

$$x(f_i) \leq 5$$

$$10i \leq 5$$

$$i \leq 0.5$$

But  $i$  can only take the values from 1 to 6. So the outcome set would be empty.

$$B = \phi = \{\}$$

## Solution

(iii) Given condition,

$$\{20 \leq x \leq 35\}$$

This can be written as,

$$20 \leq x(f_i) \leq 35$$

$$20 \leq 10i \leq 35$$

$$2 \leq i \leq 3.5$$

So the outcome set would be,

$$C = \{f_2, f_3\}$$

## Solution

(iv) Given condition,

$$\{x = 40\}$$

This can be written as,

$$x(f_i) = 40$$

$$10i = 40$$

$$i = 4$$

So the outcome set would be,

$$D = \{f_4\}$$



## Solution

(v) Given condition,

$$\{x = 5\}$$

This can be written as,

$$x(f_i) = 5$$

$$10i = 5$$

$$i = 0.5$$

But  $i$  can only take the values from 1 to 6. So the outcome set would be empty.

$$E = \phi = \{\}$$