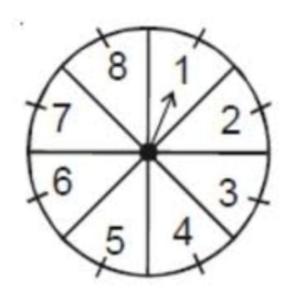1

Assignment 1 (10.15.1.12)

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Problem: A game of chance consists of spinning an arrow which comes to rest pointing at one of the numbers 1, 2, 3, 4, 5, 6, 7, 8, and these are equally likely outcomes. What is the probability that it will point at

(i) 8?
(ii) an odd number?
(iii) a number greater than 2?
(iv) a number less than 9?

Solution: Since, the numbers on the wheel are equally likely to come, this is a uniform distribution.

Let X be a random variable defined as the value coming on the wheel.

$$\therefore \Pr(X = x) = \begin{cases} \frac{1}{8} & 1 \le x \le 8 \\ 0 & otherwise \end{cases}$$

So the Cumulative Distribution Function (CDF) would be,

$$F_X(x) = \Pr(X \le x)$$

$$= \begin{cases} 0 & x \le 0 \\ \sum_{i=0}^{x} \Pr(X = i) & 1 \le x \le 8 \\ 1, & x \ge 9 \end{cases}$$

(i) Clearly, from the pmf,

$$\Pr(X = 8) = \frac{1}{8}$$

(ii) Let x ∈ {1, 3, 5, 7}

$$\therefore \Pr(X = x) = \Pr(X = 1) + \Pr(X = 3) + \Pr(X = 5) + \Pr(X = 7)$$

$$= \frac{4}{8}$$

$$\therefore \Pr(X = x) = \frac{1}{2}$$

(iii) For the number to be greater than 2,

$$\Pr(X > 2) = 1 - \Pr(X \le 2)$$
$$= 1 - F_X(2)$$
$$= \frac{6}{8}$$
$$= \frac{3}{4}$$

(iv) For the number to be less than 9,

$$\Pr(X < 9) = \Pr(X \le 8)$$
$$= F_X(8)$$
$$= \frac{8}{8}$$
$$= 1$$