Assignment 4

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Abstract—**This document contains the solution for Assignment 4 (NCERT Class 10 15.2 Example 10)**

15.2 (10) In a musical chair game, the person playing the music has been advised to stop playing the music at any time within 2 minutes after she starts playing. What is the probability that the music will stop within the first half-minute after starting?

Solution: Let the random variable $X \in [0, 2]$ denote 'time after the start the music stops (in minutes)' Let $f_X(x)$ be the probability density function, then

$$\int_{-\infty}^{\infty} f_X(x) = 1 \qquad (1)$$

$$\int_{0}^{2} f_X(x) = 1 \qquad (2)$$

$$f_X(x) = \frac{1}{2} \qquad (3)$$

PDF is defined as

$$f_X(x) = \begin{cases} \frac{1}{2} & 0 \le x \le 2 \\ 0 & \text{otherwise} \end{cases} \qquad (4)$$

The probability that the musics stops during the first $\frac{1}{2}$ minute is given by

$$\Pr\left(0 \le X \le \frac{1}{2}\right) = \int_{0}^{\frac{1}{2}} f_X(x)\, dx \qquad (5)$$

$$= \int_{0}^{\frac{1}{2}} \frac{1}{2}\, dx \qquad (6)$$

$$= \frac{1}{2} \times \frac{1}{2} \qquad (7)$$

$$= \frac{1}{4} \qquad (8)$$

Hence, the probability that the music will stop within the first half-minute after starting is $\frac{1}{4}$.
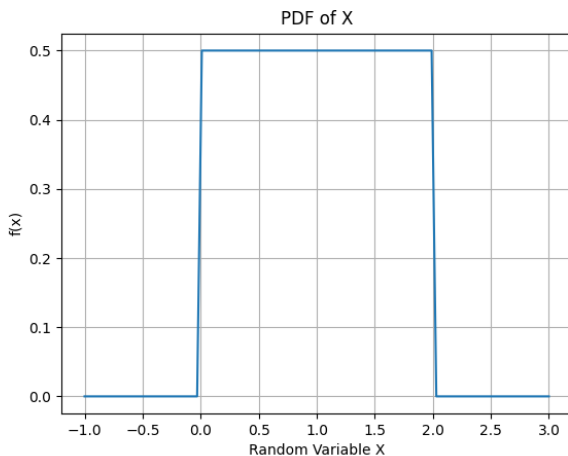

Fig. 1.