

Question 10.13.2.6

Probability and Random Processes

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Question 10.13.2.6:

A game consists of spinning an arrow which comes to rest pointing at one of the regions (1, 2 or 3) (Fig. 13.1). Are the outcomes 1, 2 and 3 equally likely to occur? Give reasons.

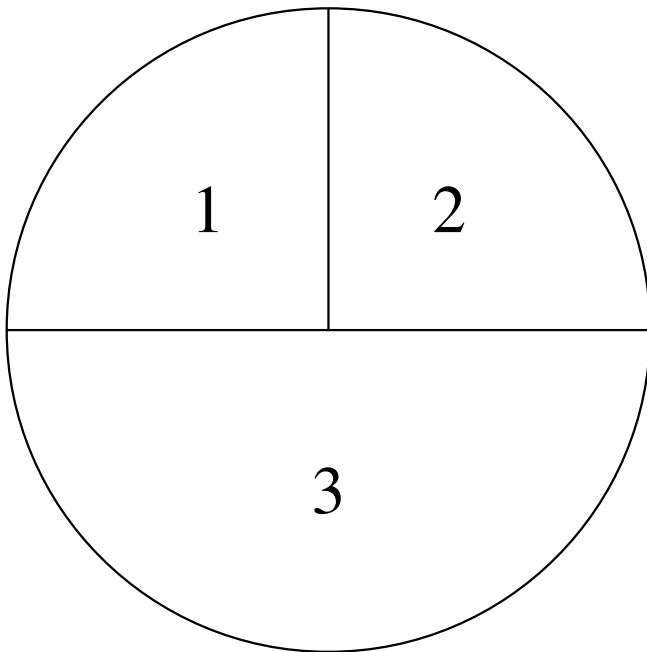


Fig. 0. Fig.13.1

$$p_X(k) = \frac{\text{Angle covered by region } k}{\text{Total angle}} \quad (1)$$

$$\therefore p_X(1) = \frac{90^\circ}{360^\circ} = \frac{1}{4} \quad (2)$$

$$= 0.25 \quad (3)$$

$$p_X(2) = \frac{90^\circ}{360^\circ} = \frac{1}{4} \quad (4)$$

$$= 0.25 \quad (5)$$

$$p_X(3) = \frac{180^\circ}{360^\circ} = \frac{1}{2} \quad (6)$$

$$= 0.5 \quad (7)$$

$$\therefore p_X(k) = \begin{cases} 0.25 & k = 1 \\ 0.25 & k = 2 \\ 0.5 & k = 3 \end{cases} \quad (8)$$

$p_X(k)$ are not equal for all k . Therefore, the events are not equally likely.

Solution:

Define a random variable X such that,
 $X = k$ denote the event of arrow resting in region k

$p_X(k)$ = Probability of the arrow to rest in region k