AI1103 : Assignment-1

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QUESTION-5.6

If a leap year is selected at random what is the chance that it will contain 53 Tuesdays?

SOLUTION-5.6

Number of days in a leap year can be written as:

$$366 = 52 \times 7 + 2$$

Hence a leap year has 52 weeks and an extra two days.

Define a random variable $X = \{0, 1\}$ as shown in below table such that $X = 0$ and $X = 1$ denote the leap year has 52 and 53 Tuesdays respectively.

Let us set the number of leap years one chooses from as 4900.

$$\therefore n(Year) = 4900 \qquad (5.6.1)$$

TABLE 0

S.No	X	2 Extra Days	$n(X)$
1)	0	(Sun,Mon)	700
2)	1	(Mon,Tue)	700
3)	1	(Tue,Wed)	700
4)	0	(Wed,Thu)	700
5)	0	(Thu,Fri)	700
6)	0	(Fri,Sat)	700
7)	0	(Sat,Sun)	700

$$\therefore n(X = 1) = 700 \times 2 = 1400 \qquad (5.6.2)$$

Probability for the occurrence of the event $X = 1$ is given by: (from (5.6.1) and (5.6.2))

$$\therefore \Pr(X = 1) = \frac{n(X = 1)}{n(Year)} = \frac{1400}{4900} = \frac{2}{7} \qquad \text{(Ans)}$$