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EE22BTECH11029 - Komakula Sreeja

Question 10.13.1.19

The probability that a non leap year selected at random will contain 53 sundays.

Solution: A non-leap year has 365 days, and a week has 7 days. Using the modulo operator, we can calculate the number of weeks and the remaining days as follows:

no. of remaining days =
$$365 \pmod{7} = 1$$
. (1)

no. of weeks =
$$\frac{365 - 1}{7} = \frac{364}{7} = 52$$
. (2)

Therefore, a non-leap year has 52 weeks and 1 day in total.

$$\implies$$
 52 sundays (3)

Let X denote the day of a week.

$$p_X(k) = \frac{1}{7} \quad \{1 \le k \le 7\} \tag{4}$$

Hence probability of the extra day being a sunday is

$$p_X(1) = \frac{1}{7} (5)$$

TABLE 1: Representation of X

Parameters	Values	Description
X	1	Sunday
	2	Monday
	3	Tuesday
	4	Wednesday
	5	Thursday
	6	Friday
	7	Saturday