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:

$$\text{no. of remaining days} = 365 \pmod 7 = 1. \tag{1}$$

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

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

$$\implies 52 \text{ sundays} \tag{3}$$

Let X denote the day of a week.

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

Hence probability of the extra day being a sunday is

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

TABLE 1: Representation of X_i

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