Question 10.13.1.19

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

Solution: We know that a non leap year has 365 days and a week has 7 days. So a non leap year has 52 weeks and a day in total.

Let

$$X = \begin{cases} 0 & n \not\equiv 0 \pmod 7 \\ 1 & n \equiv 0 \pmod 7 \end{cases} \tag{1}$$

Then

$$p_X(0) = \frac{6}{7} \tag{2}$$

$$p_X(1) = 1 - p_X(0) \tag{3}$$

$$= 1 - \frac{6}{7} \tag{4}$$

$$= \frac{1}{7} \tag{5}$$