A1110 Assignment 1
11.16.4.9

SHIRSENDU PAL

CH22BTECH11033

Question: : 16 : If 4-digit numbers greater than 5,000 are randomly formed from the digits 0, 1, 3, 5, and 7, what is the probability of forming a number divisible by 5 when, (i) the digits are repeated? (ii) the repetition of digits is not allowed?

Solution: : Let;

$$R := \begin{cases} 1, & \text{if repetition allowed} \\ 0, & \text{if repetition not allowed} \end{cases}$$

$$T := \{0, 1, 3, 5, 7\}$$

$$S := \{x \mid (x \geq 5001) \wedge (\text{digits}(x) \in T)\}$$

$$\therefore \mid S \mid = 2 * 5^3 - 1 = 249$$

$\because$ 2 choices for first position 2 choices for last position and 5 choices for middle position. Also, exclude case for 5000.

(i) Let:

$$E_1 := \{x \mid (x \in S) \wedge (5 \mid x) \wedge (R = 1)\}$$
$$\therefore \mid E_1 \mid = 2 * 2 * 5^2 - 1 = 99.$$
$$\Pr(E_1) = \frac{\mid E_1 \mid}{\mid S \mid} = \frac{33}{83}.$$

(ii) Let:

$$E_2 := \{x \mid (x \in S) \wedge (5 \mid x) \wedge (R = 0)\}$$
$$\therefore \mid E_2 \mid = 1 * 1 *^3 P_2 + 1 * 2 *^3 P_2 = 18$$
$$\Pr(E_2) = \frac{\mid E_2 \mid}{\mid S \mid} = \frac{6}{83}.$$

*The student is from Department of Chemical Engineering, Indian Institute of Technology, Hydeabad. e-mail: ch22btech11033@iith.ac.in