

ASSIGNMENT-2

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MISCELLINIOUS EXERCISE 16 : Q9

Question : 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 $X=\{1,2,3,4\}$ be a random variable which represents the 4-digit number formed from the digits 0,1,3,5 and 7 and the repetition of digits in the 4-digit number.

EVENT	DESCRIPTION
X=1	4-digit number formed from the digits 0,1,3,5 and 7
X=2	4-digit number formed without the digits 0,1,3,5 and 7
X=2	repetition of digits in the 4-digit number
X=4	without repetition of digits in the 4-digit number

TABLE II

There are three possible cases :

- a) first digit = 5
last digit = 0
- b) first digit = 7
last digit = 0
- c) first digit = 7
last digit = 5
- d) repetition not allowed \Rightarrow second and third digits = two digits from the three left

$$\Rightarrow \Pr\left(\frac{X=1}{X=4}\right) = \frac{6+6+6}{2 \times 4 \times 3 \times 2} \quad (5)$$

$$= \frac{18}{48} \quad (6)$$

$$= \frac{3}{8}. \quad (7)$$

(i)

$$\Pr\left(\frac{X=1}{X=3}\right) \quad (1)$$

- a) Greater than 5,000 \Rightarrow first digit = 5 or 7.
- b) Divisible by 5 \Rightarrow last digit = 0 or 5.
- c) repetition allowed \Rightarrow second and third digits = 0 or 1 or 3 or 5 or 7.

$$\Rightarrow \Pr\left(\frac{X=1}{X=3}\right) = \frac{(2 \times 5 \times 5 \times 2 - 1)}{(2 \times 5 \times 5 \times 5 - 1)} \quad (2)$$

$$= \frac{99}{249}. \quad (3)$$

(ii)

$$\Pr\left(\frac{X=1}{X=4}\right) \quad (4)$$