

PROBABILITY

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IITH Future Wireless Communication (FWC)

Module 2

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The number lock of a suitcase has 4 wheels each labelled with ten digits i.e. from 0 to 9. The lock opens with a sequence of four digits with no repeats. What is the probability of a person getting the right sequence to open the suitcase?

Solution:

Let, the numbers be $X = \{0, 1, 2, 3\}$ and the digits be $Y = \{0, 1, 2, \dots, 9\}$

There are 10 digits out of which 4 digits are to be chosen with no repeats possible placement of digits are,

$${}^nP_r = \frac{n!}{(n-r)!} \quad (1)$$

$n=10, r=4$

$${}^{10}P_4 = \frac{10!}{(10-4)!} = \frac{10!}{6!} = \frac{10 \times 9 \times 8 \times 7 \times 6!}{6!} = 5040 \quad (2)$$

But since, the lock can open with only one correct sequence out of the all 4 digit numbers.

Let A be the event the correct sequence is selected So, $n(A)=1$

Probability of correct sequence is selected, $P(A)$

$$= \frac{\text{No of Possible outcomes}}{\text{Total number of outcomes}} \quad (3)$$

$$P(A) = \frac{n(A)}{n(s)} = \frac{1}{5040} \quad (4)$$

Therefore, the probability of getting the right sequence to open the suitcase is

$$\boxed{\frac{1}{5040}} \quad (5)$$