Find Probability Of Unit's Digit Of Telephone Numbers

Objective

To find experimental probability of unit's digits of telephone numbers listed on a page selected at random of a telephone directory.

Materials Required

1. Telephone directory
2. Ruler
3. Notebook
4. Pen

Prerequisite Knowledge

Basic knowledge of probability.

Theory

1. If E is an event that happen when an experiment is performed, then the experimental or empirical probability of the event E is given by
   P(E) =
   or
   Probability of an event E = P(E) = $\frac{Number\ of\ trials\ in\ which\ the\ event\ occurred}{Total\ number\ of\ trials}$
2. The probability of happening of an event always lies from 0 to 1, i.e. $0 \leq P(E) \leq 1$. In percentage, it lies from 0% to 100%.
3. If probability of an event say A is 1, i.e. P(A) = 1, then event A is called a certain event or sure event.
4. If probability of an event say B is 0, i.e. P(B) = 0, then event B is called an impossible event.
5. The sum of all the probabilities of all possible outcomes of an experiment is 1.

Procedure

1. Taking a telephone directory, select any page at random.
2. Suppose the count of total telephone numbers on the selected page is N.
3. Unit place of any telephone number can be occupied by any one of the digits 0,1,2, ……. 9.
4. Now, using tally marks, prepare a frequency distribution table for the digits at unit's place.
5. Now, using the table, write the frequency of each of the digits 0,1,2, …….. 9.
6. By using the formula for experimental probability, find the probability of each digit.

Demonstration

1. Firstly, by using tally marks, prepare a frequency distribution table for the digits 0,1,2,…. 9

Digits	0	1	2	3	4	5	6	7	8	9
Tally marks frequency	n0	n1	n2	n3	n4	n5	n6	n7	n8	n9

2. From the table, note down the frequency of each digit from 0 to 9.

3. We get that digits 0, 1,2,…, 9 are occurring n0, n1, n2, …, n9 times respectively.

4. Considering the occurrence of each digit as an event E, the probability of event E is

$$P(E) = \frac{Number\ \ of\ \ trials\ \ in\ \ which\ \ event\ \ occurred}{Total\ \ number\ \ of\ \ trials}$$

Hence, respective experimental probability of occurrence of 0, 1, 2, …, 9 is given by
$P(0) = \frac{n_0}{N}$, $P(1) = \frac{n_1}{N}$, ……., $P(9) = \frac{n_9}{N}$

Observations

Total telephone numbers on a page (N) = ……
Number of times 0 occurring at unit's place (n_0) = ……..
Number of times 1 occurring at unit's place (n_1) = …….
Number of times 2 occurring at unit's place (n_2) = ……..
Number of times 3 occurring at unit's place (n_3) = ……
Number of times 4 occurring at unit's place (n_4) = ……
……..
……
Number of times 9 occurring at unit's place (n_9) = …….
Hence, experimental probability of occurrence of 0 = P(0) = $\frac{n_0}{N}$
Now, experimental probability of occurrence of 1 = P(1) = $\frac{n_1}{N}$
P(2) = $\frac{n_2}{N}$
…….
…….
P(9) = $\frac{n_9}{N}$

Result

We have got the experimental probability of unit's digits of telephone numbers listed on a page selected at random of a telephone directory.

Applications

The concept of experimental probability is useful in

1. deciding premium tables by insurance companies. .
2. stock market to forecast the performance of a company, by metrological department to forecast weather.

Viva-Voce

Question 1.
How will you define an event?
Answer:
An event for an experiment is the collection of some outcomes of the experiment.

Question 2.
How will you define the empirical probability P(E) of an event E?
Answer:
P(E) = $\frac{Number\ of\ trials\ in\ which\ E\ has\ happened}{Total\ number\ of\ trials}$

Question 3.
What are the maximum and minimum values of the probability of an event?
Answer:
Maximum and minimum values of the probability of an event are 1 and 0 respectively.

Question 4.
What is the complement of an event E?
Answer:
1 – P(E)

Question 5.
What is the probability of a certain event?
Answer:
1

Question 6.
How many events can occur when a coin is tossed?
Answer:
Two events, i.e. head or tail.

Question 7.
How will you define a sure event?
Answer:
If probability of an event say A is 1, i.e. P(A) = 1, then event A is called a certain event or a sure event.

Question 8.
Is the sum of all the probabilities of all possible outcomes of an experiment 1?
Answer:
Yes, the sum of all the probabilities of all possible outcomes of an experiment is 1.

Suggested Activity

Find the experimental probability of getting a tail in tossing an unbiased coin 5,10,15,20,25,30 times.