Frequently Asked Questions

1. What are the different methods of obtaining Simple Random samples?

Answer:

There are many methods to proceed with simple random sampling. The most primitive and mechanical would be:

- 1) The lottery method
- 2) Mechanical randomization or Random numbers Method
- 3) Using Computers
- 2. What do you mean by Lottery method?

Answer:

This is an old classical method but it is a powerful technique and modern methods of selection are very close to this method. Each member of the population is assigned a unique number .All the units of the population are numbered from 1 to N. This is called sampling frame. These numbers are written on the small slips of paper or the small round metallic balls.

The paper slips or the metallic balls should be of the same size otherwise the selected sample will not be truly random. Each number is placed in a bowl or a hat and mixed thoroughly. The blind-folded researcher then picks numbered tags from the hat or a bowl. All the individuals bearing the numbers picked by the researcher are the subjects for the study.

Again the population of slips is mixed and the next unit is selected. In this manner, the number of slips equal to the sample size n is selected. The units of the population which appear on the selected slips make the simple random sample. This method of selection is commonly used when size of the population is small. For a large population there is a big heap of paper slips and it is difficult to mix.

3. Give one example for the lottery method.

Answer:

Let us assume that we had a school with 1000 students, divided equally into boys and girls, and we wanted to select 100 of them for further study. We put all their names in a bucket and then pull 100 names out. Not only does each person have an equal chance of being selected, we can also easily calculate the probability of a given person being chosen, since we know the sample size (n) and the population (N):

4. What are the demerits of a Lottery method?

Answer:

Lottery method is obviously impractical, if not altogether impossible to complex problems of sampling. In fact the practical utility of such a method is very much limited. The lottery method is quite time consuming and cumbersome to use if the population is sufficiently large.

The above procedure of selecting a sample becomes tedious when the population is large or when the large sample is needed. When the population is of very large size we can go for a random sample in a relatively easier way without taking the trouble of enlisting all possible samples on paper slips as explained in the lottery method.

- 5. Explain the method of drawing random numbers using random numbers?

Answer:

The method of drawing random sample using random numbers consists in the following steps:

- (i) Identify the N units in the population with the numbers from 1 to N
- (ii) Select at random any page of the random number tables and pick up the numbers in any row or column or diagonal at random
- (iii) The population units corresponding to the numbers selected in step (ii) constitute a random sample
- 6. What are the different sources of random numbers generally used in practice?

Answer:

The different sets of random numbers commonly used in practice. Are given in the form of tables which have been subjected to statistical tests for randomness of a series and their randomness has been well established for all practical purposes.

- a) Trippet's (1927) random numbers tables. (Tracts for computers, No.15, Cambridge University Press)
- b) Trippet Number Table consists of 10,400 4 digited random numbers , giving in all 10,400 x4 i.e., 41,600 digits selected at random from the British Census Reports
- c) Fisher and Yates (1938) tables (In Statistical tables for biological, agricultural and medical research) comprise 15,000 digits arranged in two's. Fisher and Yates obtained these tables by drawing numbers at random from the 10th to 19th digits of A. S Thomson's 20 figure logarithmic tables

- d) Kendall and Babington Smith's (1939 random tables consists of 1,00,000 digits grouped into 25,000 sets of 4 digited random numbers (Tracts for computers, No.24, Cambridge university Press)
- e) Random Corporation (1955) (Free Press, Illinois) random number table consists of 1 million random digits consisting of 2, 00,000 random numbers of 5 digits each.
- 7. How do you select simple random samples from an ungrouped data?

Answer:

All the units of the population are numbered from 1 to N or from 0 to N-1. We consult the random number table to take a simple random sample. Suppose the size of the population is 80 and we have to select a random sample of 8 units.

The units of the population are numbered from 01 to 80. We read two-digit numbers from the table of random numbers. We can take a start from any columns or rows of the table. Let us consult random number table given in this content. Two-digit numbers are taken from the table. Any number above 80 will be ignored and if any number is repeated, we shall not record it if sampling is done without replacement. Let us read the first two columns of the table. The random number from the table is 10, 37, 08, 12, 66, 31, 63 and 73. The two numbers 99 and 85 have not been recorded because the population does not contain these numbers. The units of the population whose numbers have been selected constitute the simple random sample. If we have numbers which are already copied then the scheme is called with Replacement (WR) scheme. If we do not copy the numbers which are already copied then the scheme is called Without Replacement (WOR) scheme.

8. Explain briefly the procedure of selecting random samples from a frequency distribution?

Answer:

We follow the following procedure for the selection of the sample from grouped data or frequency distribution.

- 1) We first cumulate the given frequencies
- 2) Corresponding to the cumulative frequencies the inclusive class intervals are formed
- 3) The required sample is obtained by drawing random numbers from Fisher & Yates Table
- 4) Same procedure is applied as that of ungrouped data.
- 9. How do you draw random samples from a contingency table?

Answer:

Selection of the sample from Contingency Table consists of the following steps

- 1) Cumulate the frequencies of the first, second,, last Rows.
- 2) Inclusive class Intervals corresponding to the cumulative frequencies are formed.

- 3) Apply same procedure as that of Ungrouped data
- 4) Required sample is obtained by drawing random numbers from Fisher & Yates Table.
- 10. Explain the method of drawing random samples from an infinite population.

Answer:

It is relatively difficult to explain the concept of random sample from an infinite population. However few examples will show the basic characteristic of such a sample. Suppose we consider the 20 throws of a fair dice as a sample from the hypothetically infinite population which consists of the results of all possible throws of the dice. If the probability of getting a particular number say 1, is the same for each throw and the 20 throws are all independent then we say that the sample is random.

Similarly it would be said to be sampling from an infinite population if we sample with replacement from a finite population and our sample would be considered as a random sample if in each draw all elements of the population have the same probability of being selected and successive draws happen to be independent. In brief one can say that selection of each item in a random sample from an infinite population is controlled by the same probabilities and that successive selections are independent of one another.

11. Draw a Random sample of 10 products manufactured by a firm which has produced totally 7000 products.

Answer:

Given N=7000 has 4 digits and n=10.

We shall select 10, 4 digited random numbers (since 7000 has 4 digits) from Fisher & Yates Table leaving the numbers 0000 and the numbers greater than 7000 under without replacement scheme from page. No.134, column 1.

The required sample is 0352, 4976, 4365, 3652, 5691, 7052, 6819, 5920, 1367, and 4032. Hence we have to select the products numbered.

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352, 4976, 4365, 3652, 5691, 7052, 6819, 5920, 1367, 4032
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12. Nine villagers in a certain administrative area contain 793, 170, 970, 657, 1721, 1603, 864, 383 and 826 fields respectively. Make a random selection of 6 fields using the random numbers.

7358, 922, 4112, 3596, 633 and 3999

Answer:

Villages Fields	Cum. Freq	Incl.C.I	Tally Marks	Total
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1	793	793	0000-0793	1	1
•	700	700	0000 0700	,	•
2	170	963	0794-0963	/	1
3	970	1933	0964-1933		0
4	657	2590	1934-2590		0
5	1721	4311	2591-4311		3
6	1603	5914	4312-5914		0
7	864	6778	5915-6778		0
8	383	7161	6779-7161		0
9	826	7987	7162-7987	/	1

Hence a random sample of 6 fields is obtained as follows:

Villages	1	2	3	4	5	6	7	8	9
No.of fields	1	1	0	0	3	0	0	0	1

13. The following frequency distribution relates to the number of seeds per pod for 210 pods

No. of seeds: 1 2 3 4 5 6 7 Frequency: 4 35 78 52 30 9 2

Given the following random numbers draw an SRSWOR samples of 10pods from the given population.

190, 044, 193, 181, 121, 179, 121, 194, 209, 009, 156, 113, 038, 199, 144, 172, 124, 179, 200, 088.

Answer:

No.of seeds	Frequency	Cum. Freq	Incl.C.I	Tally Marks	Total
1	4	4	000-004		0
2	35	39	005-039	/	1
3	78	117	040-117	/	1
4	52	169	118-169		2

5	30	199	170-199	7##-	5
6	9	208	200-208		0
7	2	210	209-210	/	1

Hence a random sample of 6 fields are obtained as follows

Villages	1	2	3	4	5	6	7
No.of pods	0	1	1	2	5	0	1

14. Draw a random sample of size 15 from the following contingency table related to casting of votes by democrats & republicans on a particular proposal of national importance

	In favor	Opposed	Undecided
Democrats	85	78	37
Republicans	180	61	25

Random numbers are:

221, 193, 167, 032, 236, 153, 369, 188, 097, 129, 386, 021, 357, 262, 375

Answer:

	In favor	Opposed	Undecided
Democrats	85	163	200
	000 – 085	086- 163	164-200
	//	///	///
Republicans	380	441	466
	201-380	381-441	442-466
	7+++-1	/	

The required sample is

	In favor	Opposed	Undecided
Democrats	2	3	3
Republicans	6	1	0

15. The following contingency table relates to the smoking ability per day and the economic status of people located in a region. Draw a random sample of size 10 using WOR scheme from the above table using the following random numbers. 234, 228, 190, 44, 93, 282, 321, 179, 221, 294, 310, 009, 256, 113, 124, 179, 26, 88.

	Economic Status						
No. of Cigarates		Royal	Rich	Middle class			
	0-5	18	51	40			
	5-10	40	14	12			
	10-15	21	22	10			

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Answer:

Economic status

No. of		Royal	Rich	Middle class
Cigarates	0-5	18	69	109
		000-018	019-069	070-109

		/	/	/
	5-10	149 110-149 //	163 150-163	175 164-175
	10-15	196 176-196 ///	218 197-218	228 219-228 //

The required sample is:

Economic status							
No. of Cigarates		Royal	Rich	Middle class			
	0-5	1	1	1			
	5-10	2	0	0			
	10-15	3	0	2			