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Drawing of Random Five-Digit Numbers from Tables of Random Two-Digit and Three-Digit Numbers

Dhritikesh Chakrabarty

Associate Professor, Department of Statistics, Handique Girls' College, Guwahati – 781001, Assam, India.

ABSTRACT: In 2013, Chakrabarty constructed two tables, one for random two-digit numbers and the other for random three-digit numbers. Two more such tables have been constructed in 2016. This paper describes one method of drawing of random five-digit numbers from two tables --- one of random two-digit numbers and the other of random three-digit numbers. Some numerical examples have also been worked out in order to show the application of the method.

KEYWORDS: Random two-digit numbers, random three-digit numbers, drawing of random five-digit numbers.

I. INTRODUCTION

In order to draw random sample, a number of tables of random numbers have already been constructed by the renowned researchers. Some of them are (in chronological order) due to *Tippett* (1927), *Mahalanobis* (1934), *Kendall* & *Smith* (1938 , 1939), *Fisher* & *Yates* (1938), *Hald* (1952), *Royo* & *Ferrer* (1954), *RAND Corporation* (1955), *Quenouille* (1959), *Moses* & *Oakford* (1963), *Rao*, *Mitra* & *Matthai* (1966), *Snedecor* and *Cochran* (1967), *Rohlf* & *Sokal* (1969), *Manfred* (1971), *Hill* & *Hill* (1977) etc. Among these tables, the following four tables are treated as suitable in drawing of simple random sample (with or without replacement) from a population (*Cochran*, 1940): (1) Tippett's Random Numbers Table that consists of 10,400 four-digit numbers giving in all 41,600 single digits selected at random from the British Census report (*Tippett*, 1927). (2) Fisher and Yates Random Numbers Table that comprises 15000 digits arranged in two's (*Fisher* & *Yates*, 1938). (3) Kendall and Smith's Random Numbers that consists of 100,000 digits grouped into 25,000 sets of random four-digit numbers (*Kendall* & *Smith*, 1938). (4) Random Numbers Table by Rand Corporation that contains of one million digits consisting of 200,000 random numbers of 5 digits each (*Rand Corporation*, 1955). The proper randomness of these tables is yet to be tested. In a study made by *Chakrabarty* (2010) on the testing of randomness of the table due to Fisher and Yates (1938), it has been found that this table, consisting of the 7500 occurrences of the 100 two-digit numbers, is not properly random and deviates significantly from proper randomness. Due to this reason, one table consisting of 6000 random occurrences of the 100 two-digit numbers has been constructed as an alternative/competitor of this table (*Chakrabarty*, 2013*a*). Also, one table containing 5000 random occurrences of the 1000 three-digit numbers has been constructed by *Chakrabarty* (2013*b*) due to the unavailability of such table of three-digit numbers. Two more tables, one containing 20000 occurrences of random two-digit numbers and the other containing 20000 occurrences of random three-digit numbers, have also been constructed by the same author [*Chakrabarty*(2013*a* , 2016*b*)]. Recently, study has been made on testing the proper randomness of the random number tables due to Tippett (*Sarmah* & *Chakrabarty*, 2014), due to Kendall & Smith (*Sarmah* & *Chakrabarty*, 2014*b*), due to Rand Corporation (*Sarmah*, *Chakrabarty* & *Barman* (2015*b*). In the studies, each of the tables has been found to be suffered from proper randomness. This leads to think of constructing of table of random four-digit numbers and also table of random five-digit numbers. However, due to the increasing difficulties in the construction of these tables by the method composed by *Chakrabarty* (2013*a*), it has been compelled to think of an alternative approach of drawing of random four-digit numbers, random five-digit numbers etc.. In this study method of drawing random five-digit numbers from the tables of random two-digit numbers and of random three-digit numbers have been searched for. This paper describes one method of drawing of random five-digit numbers from two tables --- one of random two-digit numbers and the other of random three-digit numbers. Some numerical examples have also been worked out in order to show the application of the method.

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Vol. 3, Issue 7 , July 2016

II. DRAWING OF RANDOM TWO-DIGIT NUMBERS

The table of random two-digit numbers constructed by Chakrabarty (2013*a* , 2016*a*) carries the following features:

Features of the Table of Random Two-Digit Numbers:

(1) In the table, each of the 100 two-digit numbers occurs n times out of $100n$ consecutive occurrences ($n = 1 , 2 , \ldots\ldots$) if we start counting from the observation at the $(100k + 1)^{th}$ position ($k = 0 , 1 , 2 , \ldots\ldots$).

(2) In the table, the frequency of occurrence of each of the 100 two-digit numbers out of $100n$ consecutive trials ($n = 1 , 2 , \ldots\ldots$) may be one more or less than n if we start counting from any position.

(3) The table can be treated as random as per the logic behind the two definitions of probability namely definition in theoretically ideal situation and definition in practically ideal situation (Chakrabarty, 2011).

(4) The table is random with respect to the occurrences of the numbers row-wise but not column-wise. Thus while drawing random numbers from the table, one requires moving row-wise either to the right or to the left starting from any position in the table. The starting position and the direction of movement are to be selected at random by suitable randomized trials in order to keep their randomness intact.

Method of Drawing of Random Two-Digit Numbers from the Table:

Each of the two tables, constructed here, can be used in drawing of random two-digit numbers

(1) which are distinct

and (2) which are not necessarily distinct.

Drawing of Distinct Random Two-Digit Numbers

Suppose that we want to draw n random two-digit numbers from any one of the two tables such that the drawn numbers are distinct.

Since distinct two-digit numbers are to be drawn, one can draw a maximum of 100 such numbers since the total number of such numbers is 100.

Feature no (2), mentioned in section II**.** implies that if n two-digit numbers occurred consecutively from the $(100k + 1)^{th}$ position ($k = 0 , 1 , 2 , \ldots\ldots$) in the table are drawn subject to the feature no (4) then the drawn n numbers will be distinct and random.

Also, feature no (3), mentioned in section II, implies that if n two-digit numbers occurred consecutively in the table are drawn starting from any position then the drawn n numbers may not be distinct. Some of them may occur twice. Thus in order to draw distinct numbers, it is required to exclude the next occurrence of the same number and to draw the next consecutive number occurred in the table following feature no (4).

Thus the drawing of random two-digit numbers consists of the two basic tasks namely

(a) selection of the starting position at random

and (*b*) selection of the direction (right or left) of movement at random.

Accordingly, in order to obtain the n random two-digit numbers one is to proceed with the following steps:

1. Select the position, from where to start, at random. Since the table contains 10000 random occurrences of the 100 two- digit numbers, accordingly there are 10000 positions of the numbers namely

$$0000 , 0001 , 0002 , \ldots\ldots , 9999.$$

In selecting the starting position, one thus can apply some usual manual randomization technique of drawing one number from among the numbers

$$0000 , 0001 , 0002 , \ldots\ldots , 9999.$$

One method of drawing of such number is as follows:

Take a set of 10 identical small balls distinguishing them by marking with the 10 digits

$$0 , 1 , 2 , 3 , 4 , 5 , 6 , 7 , 8 , 9$$

and put them inside a opaque container, say C_1 .

Similarly, take another set of 4 identical small distinguishing them by marking L , R , M_1 , M_2 respectively and another opaque container, say C_2 .

Now, draw one ball at random from the container C_1 containing the 10 balls and note down digit appeared on it. Let the digit is d_1.

Next, draw another ball at random from the container C_1 containing the same 10 balls and note down digit appeared on it. Let the digit is d_2.

Then, draw one ball at random from the container C_2 putting 2 balls marked with L & R inside it.

If the drawn ball is R, put the digit d_2 at the right position of d_1 and if the drawn ball is L, put the digit d_2 at the left position of d_1.

Thus if the ball R appears, the selected two-digit number will be d_1d_2 and if the ball L appears, the selected two-digit

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Vol. 3, Issue 7 , July 2016

number will be d_2d_1.
Let the selected two-digit number be d_2d_1.
Next, draw another ball at random from the container C_1 containing all the 10 balls and note down digit appeared on it. Let the digit is d_3.
Then, draw one ball at random from the container C_2 putting 3 balls marked with L , M_1 & R inside it and put the digit d_3 at the

left position of d_2d_1 if the drawn ball is L,
middle position of d_2d_1 if the drawn ball is M_1
and right position of d_2d_1 if the drawn ball is R.

Thus the selected three-digit number will be $d_3d_2d_1$ or $d_2d_3d_1$ or $d_2d_1d_3$ in accordance with the selected ball is L or M_1 or R. Let the selected three-digit number be $d_2d_3d_1$.
Finally, draw another ball at random from the container C_1 containing all the 10 balls and note down digit appeared on it. Let the digit is d_4.
Then, draw one ball at random from the container C_2 putting 4 balls marked with L , M_1 , M_2 & R inside it and put the digit d_4 at the

left position of $d_2d_3d_1$ if the drawn ball is L,
1st middle position (from left) of $d_2d_3d_1$ if the drawn ball is M_1 ,
2nd middle position (from left) of $d_2d_3d_1$ if the drawn ball is M_2
and right position of $d_2d_3d_1$ if the drawn ball is R.

Thus the selected four-digit number will be $d_4d_3d_2d_1$ or $d_2d_4d_3d_1$ or $d_2d_1d_4d_3$ or $d_2d_1d_3d_4$ in accordance with the selected ball is L or M_1 or M_2 or R.
This selected number will be the required starting position.

2. Let the i^{th} position be selected in the earlier step. Draw the number that occurs at the i^{th} position in the table.
3. Chose whether to move towards left or towards right. The choice can be made at random by a binary trial e.g. by tossing of an unbiased coin or by drawing a number from the container C_2 putting two identical balls, marked with L and R respectively, inside it.
4. If it is chosen to move towards right, draw the numbers occurred at the positions
$$i\ ,\ i+1\ ,\ i+2\ ,\ \ldots\ldots\ldots\ ,\ i+n-1$$
in the table to obtain the n random two-digit numbers.
5. If it is chosen to move towards left, draw the numbers occurred at the positions
$$i\ ,\ i-1\ ,\ i-2\ ,\ \ldots\ldots\ldots\ ,\ i-n+1$$
in the table to obtain the n random two-digit numbers.
6. It may occur that some number or numbers among those drawn may be occurred twice. In that situation, retain only one occurrence of them and draw additional numbers appeared at the consecutive positions in the table as per requirement.
If k additional numbers are required to draw, then draw the numbers occurred at the positions
$$i+n\ ,\ i+n+1\ ,\ i+n+2\ ,\ \ldots\ldots\ldots\ ,\ i+n+k-1$$
if it is chosen to move towards right and draw the numbers occurred at the positions
$$i-n\ ,\ i-n-1\ ,\ i-n-2\ ,\ \ldots\ldots\ldots\ ,\ i-n-k+1$$
if it is chosen to move towards left.

Note 2.1: Drawing of distinct random numbers corresponds to the drawing of simple random sample without replacement.

Drawing of Random Two-Digit Numbers (Not Necessarily Distinct)

The features (1) and (2), mentioned in section II, imply that if two-digit numbers are picked up at a gap of g positions ($101 \leq g \leq 199$), the picked up numbers will not necessarily be distinct.

Thus in order to to draw n random two-digit numbers which need not necessarily be distinct, one is to proceed with the following steps:

1. Select one position from where to start at random by the similar method as in the case of drawing of distinct random two-digit numbers mentioned above. Let the i^{th} position be selected.
2. Draw the number that occurs at the i^{th} position in the table.
3. Chose the length of jump that is to be 101 or more and 199 or less at random. It can be chosen by some usual manual randomization technique of drawing one number from among the numbers
$$101\ ,\ 102\ ,\ 103\ ,\ \ldots\ldots\ldots\ldots\ ,\ 199.$$
Let the selected length of jump be l.

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Vol. 3, Issue 7 , July 2016

The random selection of the length of the jump can be done by similar method as done in the selection of the starting position.
4. Chose whether to jump towards left or towards right. The choice can be made by the same method as in the earlier case.
5. If it is chosen to jump towards right, draw the numbers occurred at the positions

$$i\ ,\ i\ +l\ ,\ i+2l\ ,\ \ldots\ldots\ldots\ldots.\ ,\ i+(n-1)l$$

in the table to obtain the required n random two-digit numbers.
6. If it is chosen to move towards left, draw the numbers occurred at the positions

$$i\ ,\ i-l\ ,\ i-2l\ ,\ \ldots\ldots\ldots\ldots.\ ,\ i-(n\ -1)\ l$$

in the table to obtain the required n random two-digit numbers.

Note 2.2: Drawing of random numbers, not necessarily, distinct corresponds to the drawing of simple random sample with replacement.

III. DRAWING OF RANDOM THREE-DIGIT NUMBERS

The table of random three-digit numbers constructed by Chakrabarty (2013*a* , 2016*a*) carries the following features:

Features of the Table of Random Three-Digit Numbers:

(1) In the table, each of the 1000 three-digit numbers occurs n times out of 1000n consecutive occurrences (n = 1 , 2 , ……….) if we start counting from the observation at the $(1000k + 1)^{th}$ position (k = 0 , 1 , 2 , ……….).
(2) In the table, the frequency of occurrence of each of the 1000 three-digit numbers out of 100n consecutive trials (n = 1 , 2 , ……….) may be one more or less than n if we start counting from any position.
(3) The table can be treated as random as per the logic behind the two definitions of probability namely definition in theoretically ideal situation and definition in practically ideal situation (Chakrabarty, 2011).
(4) The table is random with respect to the occurrences of the numbers row-wise but not column-wise. Thus while drawing random numbers from the table, one requires moving row-wise either to the right or to the left starting from any position in the table. The starting position and the direction of movement are to be selected at random by suitable randomized trials in order to keep their randomness intact.

Method of Drawing of Random Three-Digit Numbers from the Table:

Each of the two tables, constructed here, can be used in drawing of random two-digit numbers
(2) which are distinct
and (2) which are not necessarily distinct.

Drawing of Distinct Random Three-Digit Numbers

Suppose that we want to draw n random three-digit numbers from the table such that the drawn numbers are distinct. Since distinct three-digit numbers are to be drawn, one can draw a maximum of 1000 such numbers since the total number of such numbers is 1000.

Feature no (2), mentioned in section III, implies that if n three-digit numbers occurred consecutively from the $(100k + 1)^{th}$ position (k = 0 , 1 , 2 , ……….) in the table are drawn subject to the feature no (4) then the drawn n numbers will be distinct and random.

Also feature no (3), mentioned in section III, implies that if n three-digit numbers occurred consecutively in the table are drawn starting from any position then the drawn n numbers may not be distinct. Some of them may occur twice. Thus in order to draw distinct numbers, it is required to exclude the next occurrence of the same number and to draw the next consecutive number occurred in the table following feature no (4) mentioned in section III.

Thus the drawing of random three-digit numbers consists of the two basic tasks namely
(b) selection of the starting position at random
and (*b*) selection of the direction (right or left) of movement at random.

Accordingly, in order to obtain the n random two-digit numbers one is to proceed with the following steps:
1. Select the position, from where to start, at random. Since the table contains 10000 random occurrences of the 100 two-digit numbers, accordingly there are 10000 positions of the numbers namely

0000 , 0001 , 0002 , …………… , 9999.

In selecting the starting position, one thus can apply some usual manual randomization technique of drawing one number from among the10000 numbers

0000 , 0001 , 0002 , …………… , 9999

in the case of the table of random three-digit numbers due to Chakrabarty (2013 *b*)
and from among the 20000 numbers

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International Journal of Advanced Research in Science, Engineering and Technology
Vol. 3, Issue 7 , July 2016

00000 , 00001 , 00002 , …………… , 19999

in the case of the table of random three-digit numbers due to Chakrabarty (2016 *b*).

One method of drawing of such number is as follows:

For the table of random three-digit numbers due to Chakrabarty (2013 *b*)

Take a set of 10 identical small balls distinguishing them by marking with the 10 digits

0 , 1 , 2 , 3 , 4 , 5 , 6 , 7 , 8 , 9

and put them inside a opaque container, say C_1 .

Similarly, take another set of 4 identical small distinguishing them by marking L , R , M_1 , M_2 respectively and another opaque container, say C_2 .

Now, draw one ball at random from the container C_1 containing the 10 balls and note down digit appeared on it. Let the digit is d_1.

Next, draw another ball at random from the container C_1 containing the same 10 balls and note down digit appeared on it. Let the digit is d_2.

Then, draw one ball at random from the container C_2 putting 2 balls marked with L & R inside it.

If the drawn ball is R, put the digit d_2 at the right position of d_1 and if the drawn ball is L, put the digit d_2 at the left position of d_1.

Thus if the ball R appears, the selected two-digit number will be d_1d_2 and if the ball L appears, the selected two-digit number will be d_2d_1.

Let the selected two-digit number be d_2d_1.

Next, draw another ball at random from the container C_1 containing all the 10 balls and note down digit appeared on it. Let the digit is d_3.

Then, draw one ball at random from the container C_2 putting 3 balls marked with L , M_1 & R inside it and put the digit d_3 at the

left position of d_2d_1 if the drawn ball is L,
middle position of d_2d_1 if the drawn ball is M_1
and right position of d_2d_1 if the drawn ball is R.

Thus the selected three-digit number will be $d_3d_2d_1$ or $d_2d_3d_1$ or $d_2d_1d_3$ in accordance with the selected ball is L or M_1 or R. Let the selected three-digit number be $d_2d_3d_1$.

Finally, draw another ball at random from the container C_1 containing all the 10 balls and note down digit appeared on it. Let the digit is d_4.

Then, draw one ball at random from the container C_2 putting 4 balls marked with L , M_1 , M_2 & R inside it and put the digit d_4 at the

left position of $d_2d_3d_1$ if the drawn ball is L,
1st middle position (from left) of $d_2d_3d_1$ if the drawn ball is M_1 ,
2nd middle position (from left) of $d_2d_3d_1$ if the drawn ball is M_2
and right position of $d_2d_3d_1$ if the drawn ball is R.

Thus the selected four-digit number will be $d_4d_3d_2d_1$ or $d_2d_4d_3d_1$ or $d_2d_1d_4d_3$ or $d_2d_1d_3d_4$ in accordance with the selected ball is L or M_1 or M_2 or R.

This selected number will be the required starting position.

For the table of random three-digit numbers due to Chakrabarty (2013 *b*)

In the case of this table, one digit from the two digits 0 & 1 is to be selected by conducting a Bernoulli trial and is to be placed at the left position of the selected number as selected above. The number so obtained is the selected number of the starting position.

2. Let the i^{th} position be selected in the earlier step. Draw the number that occurs at the i^{th} position in the table.
3. Chose whether to move towards left or towards right. The choice can be made at random by a binary trial e.g. by tossing of an unbiased coin or by drawing a number from the container C_2 putting two identical balls, marked with L and R respectively, inside it.
4. If it is chosen to move towards right, draw the numbers occurred at the positions

   $$i \,,\; i+1 \,,\, i+2 \,,\, \ldots\ldots\ldots\ldots \,,\; i+n-1$$

   in the table to obtain the n random two-digit numbers.
5. If it is chosen to move towards left, draw the numbers occurred at the positions

   $$i \,,\; i-1 \,,\; i-2 \,,\, \ldots\ldots\ldots\ldots \,,\; i-n+1$$

   in the table to obtain the n random two-digit numbers.
6. It may occur that some number or numbers among those drawn may be occurred twice. In that situation, retain only

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Vol. 3, Issue 7 , July 2016

one occurrence of them and draw additional numbers appeared at the consecutive positions in the table as per requirement.
If k additional numbers are required to draw, then draw the numbers occurred at the positions

$$i + n , i + n +1 , , i + n +2 , \ldots\ldots\ldots , i + n + k - 1$$

if it is chosen to move towards right and draw the numbers occurred at the positions

$$i - n , i - n - 1 , , i - n - 2 , \ldots\ldots\ldots , i - n - k + 1$$

if it is chosen to move towards left.

Note 2.1: Drawing of distinct random numbers corresponds to the drawing of simple random sample without replacement.

Drawing of Random Three-Digit Numbers (Not Necessarily Distinct)

The features (1) and (2), mentioned in section III, imply that if three-digit numbers are picked up at a gap of g positions ($1001 \leq g \leq 1999$), the picked up numbers will not necessarily be distinct.

Thus in order to to draw n random three-digit numbers which need not necessarily be distinct, one is to proceed with the following steps:

1. Select one position from where to start at random by the similar method as in the case of drawing of distinct random two-digit numbers mentioned above. Let the i^{th} position be selected.
2. Draw the number that occurs at the i^{th} position in the table.
3. Chose the length of jump that is to be 1001 or more and 1999 or less at random. It can be chosen by some usual manual randomization technique of drawing one number from among the numbers

   1001 , 1002 , 1003 , …………… , 1999.

   Let the selected length of jump be l.

   The random selection of the length of the jump can be done by similar method as done in the selection of the starting position.
4. Chose whether to jump towards left or towards right. The choice can be made by the same method as in the earlier case.
5. If it is chosen to jump towards right, draw the numbers occurred at the positions

   $$i , i + l , i + 2l , \ldots\ldots\ldots , i + (n - 1) l$$

   in the table to obtain the required n random thre-digit numbers.
6. If it is chosen to move towards left, draw the numbers occurred at the positions

   $$i , i - l , i - 2l , \ldots\ldots\ldots , i - (n - 1) l$$

   in the table to obtain the required n random three-digit numbers.

Note 2.2: Drawing of random numbers, not necessarily, distinct corresponds to the drawing of simple random sample with replacement.

IV. DRAWING OF RANDOM FIVE-DIGIT NUMBERS

4. Drawing of Random Five-digit numbers:

Let d_1d_2 and $d_3d_4d_5$ be two numbers drawn at random from the table of random two-digit numbers and the table of random three-digit numbers respectively.

The possible cases that d_1d_2 will assume are the 100 two-digit numbers

00 , 01 , 02 , ………………. , 99

and the probability that d_1d_2 will assume any of them is equal which is 0.01.

Similarly, possible cases that $d_3d_4d_5$ will are the possible 1000 three-digit numbers

000 , 001 , 002 , ………………. , 999

and the probability that $d_3d_4d_5$ will assume any of them is equal which is 0.001.

Now if these two numbers are combined together to form the five-digit number $d_1d_2d_3d_4d_5$ then possible cases that $d_1d_2d_3d_4d_5$ will assume are the 10000 five-digit numbers

00000 , 00001 , 00002 , ………………………………………………. , 99999

and the probability that $d_1d_2\, d_3d_4d_5$ will assume any one of them is equal which is 0.00001 (since the two numbers d_1d_2 and $d_3d_4d_5$ have been drawn independently).

Thus the number $d_1d_2\, d_3d_4d_5$ is a random one.

Similarly, the number $d_3d_4d_5d_1d_2$ is also a random one.

If the same trial is performed again, one more random five-digit number can be obtained. By the repetitions of the trial, one can obtain more random five-digit numbers of the form $d_1d_2\, d_3d_4d_5$ if two-digit numbers are placed at left while to form five-digit numbers and of the form $d_3d_4d_5d_1d_2$ $d_3d_4d_5$ if three-digit numbers are placed at left while to form five-digit numbers.

Thus, in order to draw *n* random five-digit numbers one can proceed with the following steps:

(1) Make a choice at random whether two-digit numbers will be placed at the left position or three-digit numbers will be placed at the left position while combining them in the formation of random five-digit numbers. This can be done by a binary random trial as mentioned earlier.

(2) Draw *n* random two-digit numbers from the table of random two-digit numbers.

(3) Draw *n* random three-digit numbers from the table of random two-digit numbers.

(4) Combine the drawn random two-digit numbers with the corresponding drawn random three-digit numbers to obtain the *n* random five-digit numbers.

In order to draw *n* random five-digit numbers one can also proceed with the following steps:

(1) Draw one random two-digit numbers from the table of random two-digit numbers.

(2) Draw one random three-digit numbers from the table of random two-digit numbers.

(3) Make a choice at random whether two-digit numbers will be placed at the left position or three-digit numbers will be placed at the left position while combining them in the formation of random five-digit numbers. This can be done by a binary random trial as mentioned earlier.

(4) Combine the two drawn numbers as per the selected choice of the positions to obtain one random five-digit number.

(5) Repeat the above four steps to obtain as many random five-digit numbers as is wanted.

V. NUMERICAL EXAMPLE

Example (4.1): Drawing of Distinct Random Two-Digit Numbers:

Let it be wanted to draw 30 random distinct two-digit numbers from the table of random three-digit numbers (Chakrabarty, 2016 *a*).

Suppose that the starting position selected at random be 1635.

The two-digit number at this position in the table is 42.

Thus this is selected as the 1st one among the 30 numbers to be selected.

Suppose that it is chosen by random trial to move towards the right direction.

Then the numbers at the positions

1636 , 1637 , ………………….. , 1664

are to be drawn.

Now the two-digit numbers at the next 29 positions in the table are

67 , 13 , 83 , 06 , 21 , 77 , 48 , 23 , 80 , 50 , 62 , 90 , 43 , 87 , 72 , 11 , 52 , 73 , 91 , 55 , 74 , 09 , 28 , 46 , 95 , 79 , 86 , 12 , 78.

Therefore, the 30 random distinct two-digit numbers will be

42 , 67 , 13 , 83 , 06 , 21 , 77 , 48 , 23 , 80 , 50 , 62 , 90 , 43 , 87 , 72 , 11 , 52 , 73 , 91 , 55 , 74 , 09 , 28 , 46 , 95 , 79 , 86 , 12 , 78.

Example (4.2): Drawing of Distinct Random Two-Digit Numbers:

Let it be wanted to draw 30 random distinct two-digit numbers from from the table of random three-digit numbers (Chakrabarty, 2016 *a*).

Suppose that the starting position selected at random be 9986.

The two-digit number at this position in the table is 87.

Thus this is selected as the 1st one among the 30 numbers to be selected.

Suppose that it is chosen by random trial to move towards the right direction.

Then the numbers at the next 29 successive positions are to be selected.

However, after the next 13 positions, the table comes to the end.

The remaining 16 positions are then taken from the beginning of the table treating the table to be a circular one.

Thus the 29 two-digit numbers at the next 29 successive positions in the table are

94 , 79 , 10 , 82 , 30 , 99 , 56 , 09 , 59 , 20 , 48 , 15 , 69 , 26 , 31 , 27 , 78 , 12 , 53 , 63 , 37 , 89 , 08 , 97 , 75 , 13 , 55 , 04 , 64.

Accordingly, the 30 random two-digit numbers drawn from the table are

87 , 94 , 79 , 10 , 82 , 30 , 99 , 56 , 09 , 59 , 20 , 48 , 15 , 69 , 26 , 31 , 27 , 78 , 12 , 53 , 63 , 37 , 89 , 08 , 97 , 75 , 13 , 55 , 04 , 64 .

Example (4.3): Drawing of Random Two-Digit Numbers (Not Necessarily Distinct):

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Vol. 3, Issue 7 , July 2016

Let it be wanted to draw 10 random two-digit numbers from from the table of random three-digit numbers (Chakrabarty, 2016 *a*) which are not necessarily be distinct.
Suppose that the starting position selected at random be 9675.
The two-digit number at this position in the table is 63.
Thus this is selected as the 1st one among the 10 numbers to be selected.
Suppose that it is chosen by random trial to move towards the right direction.
Let the length of jump selected at random be 105.
Then the next 9 positions in the table to be considered (treating the table as circular) will be

9780 , 9885 , 9990 , 0095 , 0200 , 0305 , 0410 , 0515 ,0620 .

The number appeared at these positions in the table are

82 , 65 , 82 , 83 , 10 , 72 , 96 , 52 , 27 .

Accordingly, the 10 random two-digit numbers drawn from the table are

63 , 82 , 65 , 82 , 83 , 10 , 72 , 96 , 52 , 27 .

Example (4.1): Drawing of Distinct Random Three-Digit Numbers:
Let it be wanted to draw 30 random distinct three-digit numbers from the table of random three-digit numbers (Chakrabarty, 2016 *b*).
Suppose that the starting position selected at random be 02631.
The three-digit number at this position in the table is 534.
Thus this is selected as the 1st one among the 30 to be selected.
Suppose that it is chosen by random trial to move towards the right direction.
Then the numbers at the positions

02632 , 02633 , ………………….. , 0260.

are to be drawn.
Now the three-digit numbers at the next 9 positions in the table are

270 , 367 , 715 , 203 , 267 , 662 , 513 , 638 , 328 , 071 , 488 , 025 , 835 , 950 , 704 , 135 , 472 , 447 , 391 , 495 , 390 , 259 , 314 , 893 , 199 , 896 , 850 , 614 , 374 .

Therefore, the 30 random distinct three-digit numbers will be

534 , 270 , 367 , 715 , 203 , 267 , 662 , 513 , 638 , 328 , 071 , 488 , 025 , 835 , 950 , 704 , 135 , 472 , 447 , 391 , 495 , 390 , 259 , 314 , 893 , 199 , 896 , 850 , 614 , 374 .

Example (4.2): Drawing of Distinct Random Three-Digit Numbers:
Let it be wanted to draw 30 random distinct three-digit numbers from the table of random three-digit numbers (Chakrabarty, 2016*b*).
Suppose that the starting position selected at random be 19981.
The three-digit number at this position in the table is 078.
Thus this is selected as the 1st one among the 30 numbers to be selected.
Suppose that it is chosen by random trial to move towards the right direction.
Then the numbers at the next 29 successive positions are to be selected.
However, after the next 18 positions, the table comes to the end.
The remaining 11 positions are then taken from the beginning (i.e. from position number 00000) of the table treating the table to be a circular one.
Thus the 29 three-digit numbers at the next 29 successive positions in the table are

217 , 857 , 246 , 814 , 935 , 349 , 197 , 707 , 836 , 190 , 620 , 272 , 401 , 981 , 497 , 344 , 592 , 944 , 799 , 512 , 748 , 721 , 626 , 548 , 059 , 831 , 039 , 969 , 282 .

Accordingly, the 30 random three-digit numbers drawn from the table are

078 , 217 , 857 , 246 , 814 , 935 , 349 , 197 , 707 , 836 , 190 , 620 , 272 , 401 , 981 , 497 , 344 , 592 , 944 , 799 , 512 , 748 , 721 , 626 , 548 , 059 , 831 , 039 , 969 , 282

Example (4.3): Drawing of Random Three-Digit Numbers (Not Necessarily Distinct):
Let it be wanted to draw 30 random three-digit numbers from from the table of random three-digit numbers (Chakrabarty, 2016 *b*) which are not necessarily be distinct.
Suppose that the starting position selected at random is 05378.
The three-digit number at this position in the table is 444.
Thus this is selected as the 1st one among the 15 numbers to be selected.
Suppose that it is chosen by random trial to move towards the right direction.

Let the length of jump selected at random be 1002.
Then the next 14 positions in the table to be considered (treating the table as circular) will be
6318 , 7320 , 8322 , 9324 , 10326 , 11328 , 12330 , 13332 , 14334 , 15336 , 16338 , 17340 , 18342 , 19344
The numbers appeared at these positions in the table are
194 , 121 , 530 , 895 , 183 , 500 , 239 , 291 , 980 , 503 , 477 , 392 , 526 , 963
respectively.
Accordingly, the 15 random three-digit numbers drawn from the table are
444 , 194 , 121 , 530 , 895 , 183 , 500 , 239 , 291 , 980 , 503 , 477 , 392 , 526 , 963 .

Example (4.4): Drawing of Random Five-Digit Numbers:
Let it be wanted to draw 10 random five-digit numbers.
Let a random binary trial be performed to choice whether two-digit numbers will be placed at the left position or three-digit numbers will be placed at the right position while combining them in the formation of random five-digit numbers.
Let the choice be that two-digit numbers will be placed at the left position.
Now let us draw 10 random two-digit numbers (not necessarily distinct) from the table of random two-digit numbers by the method as explained above.
Let the drawn 10 random two-digit numbers be
63 , 82 , 65 , 82 , 83 , 10 , 72 , 96 , 52 , 27 .
Next let us draw 20 random three-digit numbers from the table of random three-digit numbers by the method as explained above.
Let the drawn 10 random two-digit numbers be
530 , 895 , 183 , 500 , 239 , 291 , 980 , 503 , 477 , 392 .
Thus the 10 random five-digit numbers to be selected will be
63530 , 82895 , 65183 , 82500 , 83239 , 10291 , 72980 , 96503 , 52477 , 27392 .

VI. CONCLUSION

The method of drawing random five-digit numbers from two independent tables one of random two-digit numbers and the other of random three-digit numbers, discussed here, can be treated as an alternative of drawing the same from a table of random five-digit numbers. Thus random five-digit numbers can be drawn in the absence of a table of random five-digit numbers.
By similar method it can be possible to draw random four-digit numbers from two independent tables of random two-digit numbers. Therefore, one task for researcher at this stage is to construct two independent sets/tables of random two-digit numbers.
Another task is to construct two independent sets of random three-digit numbers in order to draw random six digit numbers by similar method.
It may be necessary to draw random m-digit numbers (for $m > 6$) in the situation of drawing of a large sample from a large population (consisting of billions of elements). It can be possible to draw random m-digit numbers (for $m > 6$) from independent tables of random two-digit numbers and/or independent tables of random three-digit numbers and/or from a combination of independent tables of random two-digit numbers and independent tables of random three-digit numbers. Therefore, there is necessity of constructing of sufficient independent tables for random two-digit numbers and also for random three-digit numbers.

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Author's Biography

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Dr. Dhritikesh Chakrabarty passed B.Sc. (with Honours in Statistics) Examination from Gauhati University in 1981 securing 1st class &1st position. He passed M.Sc. Examination (in Statistics) from the same university in the year 1983 securing 1st class & 1st position and successively passed M.Sc. Examination (in Mathematics) from the same university in 1987 securing 1st class (5th position). He obtained the degree of Ph.D. (in Statistics) in the year 1993 from Gauhati University. Later on, he obtained the degree of Sangeet Visharad (inVocal Music) in the year 2000 from Bhatkhande Sangeet vidyapith securing 1st class, the degree of Sangeet Visharad (in Tabla) from Pracheen Kala Kendra in 2010 securing 2nd class, the degree of Sangeet Pravakar (in Tabla) from Prayag Sangeet Samiti in 2012 securing 1st class and the degree of Sangeet Bhaskar (in Tabla) from Pracheen Kala Kendra in 2014 securing 1st class. He obtained Jawaharlal Nehru Award for securing 1st position in Degree Examination in the year 1981. He also obtained Academic Gold Medal of Gauhati University and Prof. V. D. Thawani Academic Award for securing 1st position in Post Graduate Examination in the year 1983.
Dr. Dhritikesh Chakrabarty is also an awardee of the Post Doctoral Research Award by the University Grants Commission for the period 2002─05.
He attended five of orientation/refresher course held in Gauhati University, Indian Statistical Institute, University of Calicut and Cochin University of Science & Technology sponsored/organized by University Grants Commission/Indian Academy of Science. He also attended/participated eleven workshops/training programmes of different fields at various institutes.
Dr. Dhritikesh Chakrabarty joined the Department of Statistics of Handique Girls' College, Guwahati, as a Lecturer on December 09, 1987 and has been serving the institution continuously since then. Currently he is in the position of Associate Professor (& Ex Head) of the same Department of the same College. He has also been serving the National Institute of Pharmaceutical Education & Research (NIPER), Guwahati, as a Guest Faculty continuously from May 02, 2010. Moreover, he is a Research Guide (Ph.D. Guide) in the Department of Statistics of Gauhati University with effect from 31-08-2010 and also Research Guide (Ph.D. Guide) in the Department of Statistics of Assam Down Town University with effect from 29-01-2013. He has been guiding a number of Ph.D. students in the two universities. He acted as Guest Faculty in the Department of Statistics and also in the Department of Physics of Gauhati University. In the mean time, he guided some M. Phil. Students of Vinayak Mission University. He also acted as Guest Faculty cum Resource Person in the Ph.D. Course work Programme in the Department of Computer Science and also in the Department of Biotechnology of the same University for the last six years. Dr. Chakrabarty has been working as an independent researcher for the last more than twenty five years. He has already published seventy one research papers in various research journals mostly of international level and eight research papers in conference proceedings. Fifty four research papers based on his research works have already been presented in research conferences/seminars of national and international levels both within and outside India. He has written a book titled "Statistics for Beginners". He is also one author of the Assamese Science Dictionary titled "Vigyan Jeuti" published by Assam Science Society. Moreover, he is one author of the research book **"**BIODIVERSITY- Threats and Conservation (ISBN-978-93-81563-48-9)" published by the Global Publishing House. He delivered invited talks/lectures in several seminars He acted as chair person in some seminars. He visited U.S.A. in 2007, Canada in 2011 and U.K. in 2014. He has already completed one post doctoral research project (2002─05) and one minor research project (2010─11). He is an active life member of each of the following academic cum research organizations:
(1) Assam Science Society (ASS)
(2) Assam Statistical Review (ASR)
(3) Indian Statistical Association (IAS)
(4) Indian Society for Probability & Statistics (ISPS)
(5) Forum for Interdisciplinary Mathematics (FIM)
(6) Electronics Scientists & Engineers Society (ESES)
(7) International Association of Engineers (IAENG)
Moreover, he is a Referee of the Journal of Assam Science Society (JASS) and a Member of the Editorial Board of the Journal of Environmental Science, Computer Science and Engineering & Technology (JECET).
Dr. Chakrabarty acted as members (at various capacities) of the organizing committees of a number of conferences/seminars already held.