Chapter 2
Random Number Generator

A Human Resources (HR) administrator wants to put together an in-house focus group of 5 of the 32 mid-level managers in her organization to discuss new ideas for benefits that could be developed and offered to employees at this organization. Suppose that she has asked you to take a random sample of 5 of these 32 managers so that she can contact them and attempt to arrange a time when this group could meet. In order for you to use your Excel skills to take this random sample, you will need to define a "sampling frame."

A sampling frame is a list of objects, events, or people from which you want to select a random sample. In this case, it is the group of 32 managers. In order to define the sampling frame, you will first need to assign a unique identifier to each person (or object) in the sampling frame. The frame starts with the identification code (ID) 1 that is assigned to the first manager in the group of 32 managers. The second manager has a code number of 2, the third a code number of 3, and so forth until the last manager has a code number of 32.

Since the group had 32 managers, your sampling frame would go from 1 to 32 with each manager having a unique ID number.

We will first create the frame numbers as follows in a new Excel worksheet:

2.1 Creating Frame Numbers for Generating Random Numbers

Objective: To create the frame numbers for generating random numbers

A3: FRAME NO.
A4: 1

Now, create the frame numbers in column A with the Home/Fill commands that were explained in the first chapter of this book (see Sect. 1.4.1) so that the frame numbers go from 1 to 32, with the number 32 in cell A35. If you need to be reminded about how to do that, here are the steps:

Click on cell A4 to select this cell
Home
Fill (then click on the "down arrow" next to this command and select)
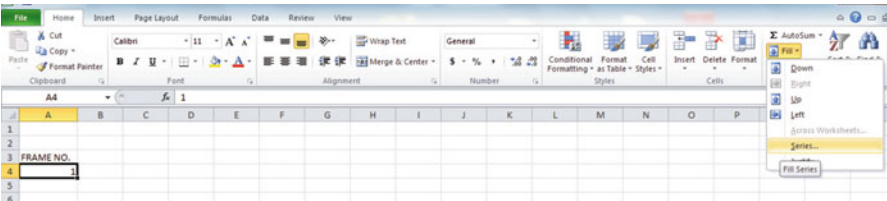Series (see Fig. 2.1)

Fig. 2.1 Dialogue Box for Fill/Series Commands

Columns
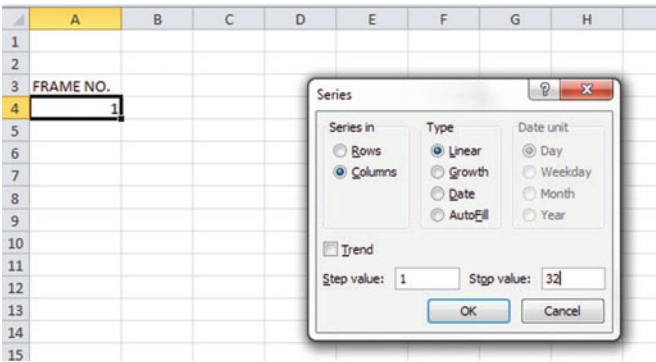Step value: 1
Stop value: 32 (see Fig. 2.2)

Fig. 2.2 Dialogue Box for Fill/Series/Columns/Step value/Stop value Commands

OK

Then, save this file as: Random29. You should obtain the result in Fig. 2.3.

Fig. 2.3 Frame Numbers
from 1 to 32

FRAME NO.
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32

Now, create a column next to these frame numbers in this manner:

B3:   DUPLICATE FRAME NO.
B4:   1

Next, use the Home/Fill command again, so that the 32 frame numbers begin in cell B4 and end in cell B35. Be sure to widen the columns A and B so that all of the information in these columns fits inside the column width. Then, center the information inside both Column A and Column B on your spreadsheet. You should obtain the information given in Fig. 2.4.

Fig. 2.4 Duplicate Frame
Numbers from 1 to 32

FRAME NO.	DUPLICATE FRAME NO.
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20
21	21
22	22
23	23
24	24
25	25
26	26
27	27
28	28
29	29
30	30
31	31
32	32

Save this file as: Random30

You are probably wondering why you created the same information in both Column A and Column B of your spreadsheet. This is to make sure that before you sort the frame numbers that you have exactly 32 of them when you finish sorting them into a random sequence of 32 numbers.

Now, let's add a random number to each of the duplicate frame numbers as follows:

2.2 Creating Random Numbers in an Excel Worksheet

C3: RANDOM NO.
        (then widen columns A, B, C so that their labels fit inside the columns; then
        center the information in A3:C35)
C4: =RAND()

Next, hit the Enter key to add a random number to cell C4.

Note that you need *both* an open parenthesis *and* a closed parenthesis to create =*RAND*(). The =RAND() command "looks to the left of the cell with the =RAND() COMMAND in it" and assigns a random number to that cell.

Now, put the pointer using your mouse in cell C4 and then move the pointer to the bottom right corner of that cell until you see a "plus sign" in that cell. Then, click and drag the pointer down to cell C35 to add a random number to all 32 ID frame numbers (see Fig. 2.5).

Fig. 2.5 Example of Random Numbers Assigned to the Duplicate Frame Numbers

FRAME NO.	DUPLICATE FRAME NO.	RANDOM NO.
1	1	0.178997426
2	2	0.269196787
3	3	0.48649709
4	4	0.882904516
5	5	0.015953504
6	6	0.099651545
7	7	0.42850057
8	8	0.381659988
9	9	0.431296832
10	10	0.476642453
11	11	0.268603728
12	12	0.871330234
13	13	0.775421903
14	14	0.908450998
15	15	0.138749452
16	16	0.159535582
17	17	0.672417279
18	18	0.956231064
19	19	0.486746795
20	20	0.83596565
21	21	0.688574546
22	22	0.467838617
23	23	0.695493167
24	24	0.226521237
25	25	0.335451708
26	26	0.209245145
27	27	0.631291464
28	28	0.210229448
29	29	0.553196562
30	30	0.494647331
31	31	0.986702143
32	32	0.178067956

Then, click on any empty cell to deselect C4:C35 to remove the dark color highlighting these cells.

Save this file as: Random31

Now, let's sort these duplicate frame numbers into a random sequence:

2.3   Sorting Frame Numbers into a Random Sequence

> Objective: To sort the duplicate frame numbers into a random sequence

Highlight cells B3:C35 (include the labels at the top of columns B and C)
Data (top of screen)
Sort (click on this word at the top center of your screen; see Fig. 2.6)
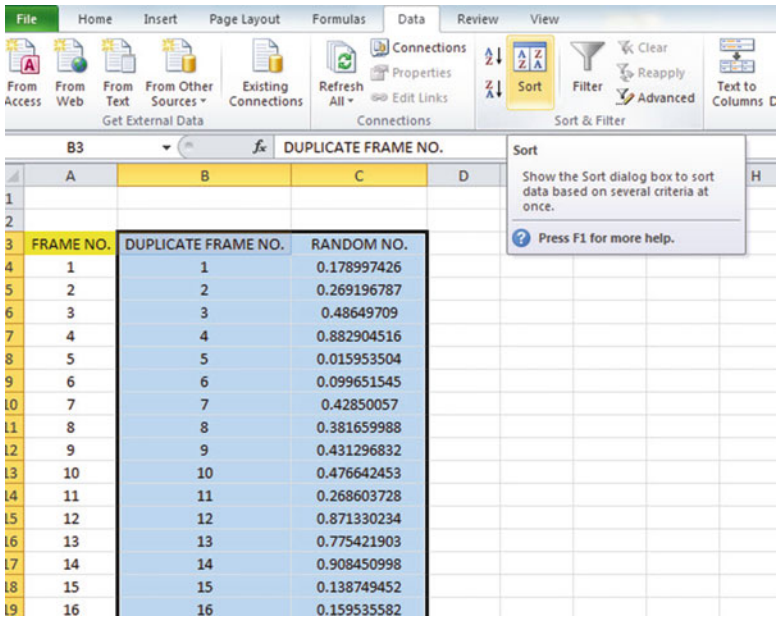

Fig. 2.6 Dialogue Box for Data/Sort Commands

Sort by: RANDOM NO. (click on the down arrow)
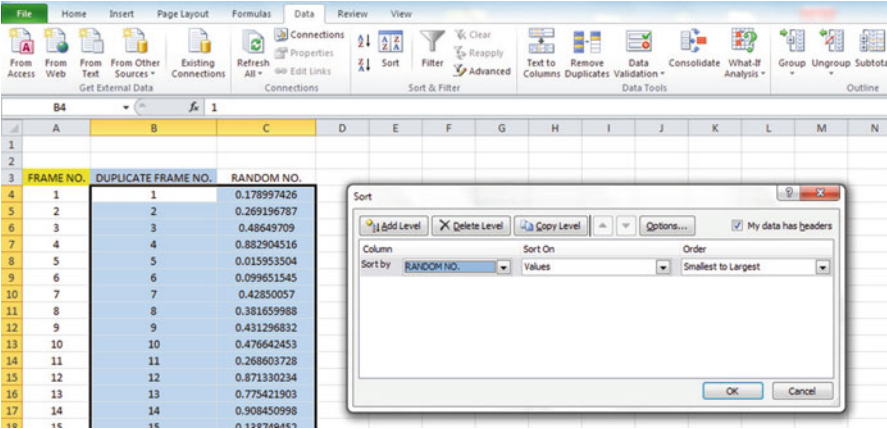Smallest to Largest (see Fig. 2.7)

Fig. 2.7 Dialogue Box for Data/Sort/RANDOM NO./Smallest to Largest Commands

OK
Click on any empty cell to deselect B3:C35.
Save this file as: Random32
Print this file now.

   These steps will produce Fig. 2.8 with the DUPLICATE FRAME NUMBERS sorted into a random order:

Important note: Because Excel randomly assigns these random numbers, your Excel commands will produce a different sequence of random numbers from everyone else who reads this book!

Fig. 2.8 Duplicate Frame
Numbers Sorted by Random
Number

FRAME NO.	DUPLICATE FRAME NO.	RANDOM NO.
1	5	0.063981403
2	6	0.977468743
3	15	0.225170263
4	16	0.765734052
5	32	0.274680922
6	1	0.594468001
7	26	0.511966171
8	28	0.625577233
9	24	0.906310053
10	11	0.488640116
11	2	0.020129977
12	25	0.723003676
13	8	0.975227547
14	7	0.469582962
15	9	0.14889954
16	22	0.955629903
17	10	0.897398234
18	3	0.314860892
19	19	0.442019486
20	30	0.078566335
21	29	0.172474705
22	27	0.104689528
23	17	0.406630369
24	21	0.961398315
25	23	0.094222677
26	13	0.323429051
27	20	0.470615753
28	12	0.978014724
29	4	0.618082813
30	14	0.727776384
31	18	0.919475329
32	31	0.324497007

Because your objective at the beginning of this chapter was to select randomly 5 of the 32 mid-level managers at your organization for a possible focus group session, you now can do that by selecting the *first five sorted ID numbers* in the DUPLICATE FRAME NO. column after the sort.

Although your first five random numbers will be different from those we have selected in the random sort that we did in this chapter, we would select these five IDs of managers using Fig. 2.9.

5, 6, 15, 16, 32

Fig. 2.9 First Five
Managers Selected
Randomly

FRAME NO.	DUPLICATE FRAME NO.	RANDOM NO.
1	5	0.063981403
2	6	0.977468743
3	15	0.225170263
4	16	0.765734052
5	32	0.274680922
6	1	0.594468001
7	26	0.511966171
8	28	0.625577233
9	24	0.906310053
10	11	0.488640116
11	2	0.020129977
12	25	0.723003676
13	8	0.975227547
14	7	0.469582962
15	9	0.14889954
16	22	0.955629903
17	10	0.897398234
18	3	0.314860892
19	19	0.442019486
20	30	0.078566335
21	29	0.172474705
22	27	0.104689528
23	17	0.406630369
24	21	0.961398315
25	23	0.094222677
26	13	0.323429051
27	20	0.470615753
28	12	0.978014724
29	4	0.618082813
30	14	0.727776384
31	18	0.919475329
32	31	0.324497007

Save this file as: Random33

Remember, your five ID numbers selected after your random sort will be different from the five ID numbers in Fig. 2.9 because Excel assigns a different random number *each time the =RAND() command is given*.

Before we leave this chapter, you need to learn how to print a file so that all of the information on that file fits onto a single page without "dribbling over" onto a second or third page.

2.4 Printing an Excel File So That All of the Information Fits onto One Page

Objective: To print a file so that all of the information fits onto one page

The three practice problems at the end of this chapter require you to sort random numbers when the files contain 63 students, 114 employees, and 75 new-hires, respectively. These files will be "too big" to fit onto one page when you print them unless you format these files so that they fit onto a single page.

Let's create a situation where the file does not fit onto one printed page unless you format it first to do that.

Go back to the file you just created, Random 33, and enter the name: *Jennifer* into cell: A50.

If you printed this file now, the name, *Jennifer*, would be printed onto a second page because it "dribbles over" outside of the page rage for this file in its current format.

So, you would need to change the page format so that all of the information, including the name, Jennifer, fits onto just one page when you print this file by using the following steps:

Click on any empty cell to change your location away from cell A50
Page Layout (top left of the computer screen)
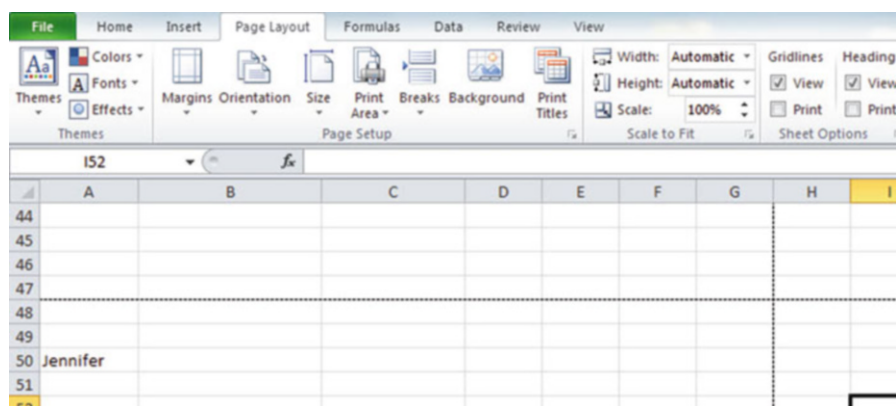(Notice the "Scale to Fit" section in the center of your screen; see Fig. 2.10)

Fig. 2.10 Dialogue Box for Page Layout/Scale to Fit Commands

Hit the down arrow to the right of 100 % *once* to reduce the size of the page to 95 %

Now, note that the name, Jennifer, is still on a second page on your screen because her name is below the horizontal dotted line on your screen in Fig. 2.11 (the dotted lines tell you outline dimensions of the file if you printed it now).
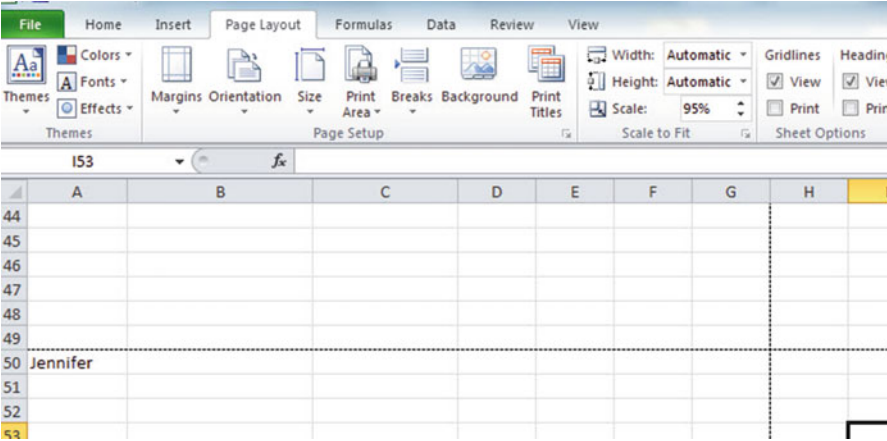
Fig. 2.11 Example of Scale Reduced to 95 % with "Jennifer" to be Printed on a Second Page

So, you need to repeat the "scale change steps" by hitting the down arrow on the right once more to reduce the size of the worksheet to 90 % of its normal size.

Notice that the "dotted lines" on your computer screen in Fig. 2.12 are now below Jennifer's name to indicate that all of the information, including her name, is now formatted to fit onto just one page when you print this file.
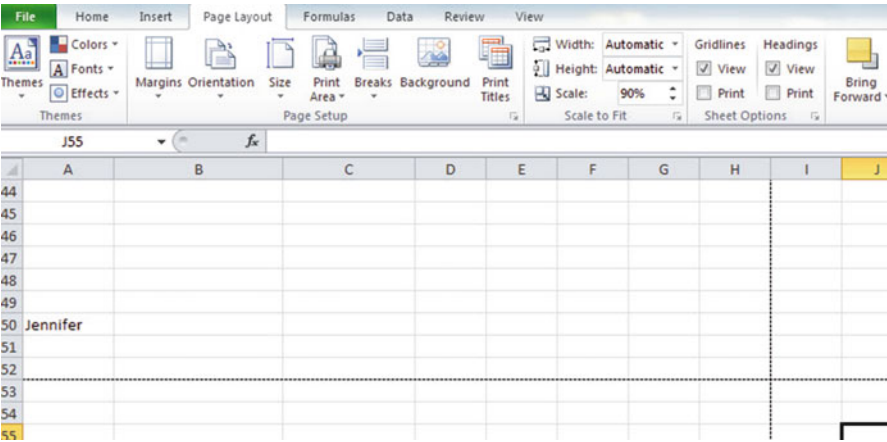

Fig. 2.12 Example of Scale Reduced to 90 % with "Jennifer" to be printed on the first page (note the dotted line below Jennifer on your screen)

Save the file as: Random34

Print the file. Does it all fit onto one page? It should (see Fig. 2.13).

Fig. 2.13 Final
Spreadsheet of 90 % Scale
to Fit

FRAME NO.	DUPLICATE FRAME NO.	RANDOM NO.
1	5	0.747176905
2	6	0.038774393
3	15	0.091368861
4	16	0.63147137
5	32	0.190734495
6	1	0.411943765
7	26	0.138033007
8	28	0.927874602
9	24	0.058336576
10	11	0.043243606
11	2	0.729011126
12	25	0.204119693
13	8	0.456656709
14	7	0.232589896
15	9	0.09096704
16	22	0.935399501
17	10	0.201267198
18	3	0.52638312
19	19	0.53734605
20	30	0.969840616
21	29	0.475657455
22	27	0.558049277
23	17	0.488444809
24	21	0.717097206
25	23	0.86192944
26	13	0.875595013
27	20	0.536748908
28	12	0.331784725
29	4	0.642847666
30	14	0.575767804
31	18	0.939789757
32	31	0.776050794

Jennifer

2.5   End-of-Chapter Practice Problems

1. Suppose that you are the Director of a Master's degree program in Human
   Resources at a university and that you want to interview a random sample of
   students who are scheduled to graduate from the program this next June so that
   you can obtain their suggestions about how the program can be improved.

Suppose that you have 63 Master's students who are scheduled to graduate. You want to randomly select 15 of these 63 students for a personal interview.

(a)   Set up a spreadsheet of frame numbers for these students with the heading: FRAME NUMBERS using the Home/Fill commands.
(b)   Then, create a separate column to the right of these frame numbers which duplicates these frame numbers with the title: Duplicate frame numbers.
(c)   Then, create a separate column to the right of these duplicate frame numbers entitled RANDOM NO. and use the =RAND() function to assign random numbers to all of the frame numbers in the duplicate frame numbers column, and change this column format so that three decimal places appear for each random number.
(d)   Sort the duplicate frame numbers and random numbers into a random order.
(e)   Print the result so that the spreadsheet fits onto one page.
(f)   Circle on your printout the I.D. number of the first 15 students that you would use in your interviews.
(g)   Save the file as: RAND9

> *Important note: Note that everyone who does this problem will generate a different random order of student ID numbers since Excel assigns a different random number each time the =RAND() command is used. For this reason, the answer to this problem given in this Excel Guide will have a completely different sequence of random numbers from the random sequence that you generate. This is normal and what is to be expected.*

2. Suppose that you are the HR director at a large company and that you want to conduct a phone interview with 10 of the 114 employees who have elected to be included in the company's Vision Care Plan which was instituted a year ago to obtain their feedback about how well the plan has been working for them.

(a)   Set up a spreadsheet of frame numbers for these claims with the heading: FRAME NO.
(b)   Then, create a separate column to the right of these frame numbers which duplicates these frame numbers with the title: Duplicate frame no.
(c)   Then, create a separate column to the right of these duplicate frame numbers entitled "Random number" and use the =RAND() function to assign random numbers to all of the frame numbers in the duplicate frame numbers column. Then, change this column format so that three decimal places appear for each random number
(d)   Sort the duplicate frame numbers and random numbers into a random order
(e)   Print the result so that the spreadsheet fits onto one page
(f)   Circle on your printout the I.D. number of the first 10 employees that would be used in this research study.
(g)   Save the file as: RANDOM6

3. Suppose, for the sake of argument, that you are the Director of HR for a large company and that you want to conduct a personal interview with 20 of the 75 new-hires in the company who recently completed a one-day orientation program about the various benefits programs available to employees at your company to see how the orientation program can be improved. You want to take a random sample of 20 of these 75 new-hires.

   (a) Set up a spreadsheet of frame numbers for these new-hires with the heading: FRAME NUMBERS.

   (b) Then, create a separate column to the right of these frame numbers which duplicates these frame numbers with the title: Duplicate frame numbers.

   (c) Then, create a separate column to the right of these duplicate frame numbers entitled "Random number" and use the =RAND() function to assign random numbers to all of the frame numbers in the duplicate frame numbers column. Then, change this column format so that three decimal places appear for each random number.

   (d) Sort the duplicate frame numbers and random numbers into a random order.

   (e) Print the result so that the spreadsheet fits onto one page.

   (f) Circle on your printout the I.D. number of the first 20 new-hires that you would select for your personal interview study.

   (g) Save the file as: RAND5