

Chapter 889

Design Generator

Introduction

This program generates factorial, repeated measures, and split-plots designs with up to ten factors. The design can be placed in the current spreadsheet.

An introduction to experimental design is presented in Chapter 881 on Two-Level Designs and will not be repeated here.

Crossed Factors

Two factors are *crossed* if all levels of one factor occur with each level of the second factor. No distinction needs to be made as to whether a factor is random or fixed. Factorial and randomized block designs are examples of designs that contain crossed factors.

Nested Factors

In the repeated measures and split-plot designs, at least one of the factors is nested in another factor. A factor is *nested* when all levels of this factor do not occur with each level of another factor. For example, suppose a study is being made to compare the heart rate of males and females. Five males and five females are selected. One factor in the study would be gender with two levels: male and female. Another factor would be individual with ten levels: P1, P2, ..., and P10. Since five of the ten individuals are in the males group and the other five individuals are in the females group, individuals are nested within gender.

The basic structure of *repeated measures* and *split-plot* designs is identical. The difference between the two is in the way the factor levels are assigned within the individual factor. Consider an exercise study in which heart rate readings are to be made on an individual at five different points in time. If the amounts of exercise is assigned at random before each reading, the design is a split plot. If the amounts of exercise follow the same pattern for each individual, the design is a repeated measures.

Example 1 – Three-by-Four Factorial Design with Three Replicates

This section presents an example of how to degenerate a three-by-four factorial design with three replicates per treatment combination. To run this example, take the following steps. **CAUTION: since the purpose of this routine is to generate data, you should always begin with an empty output spreadsheet.**

Setup

If the procedure window is not already open, use the PASS Home window to open it. The parameters for this example are listed below and are stored in the **Example 1** settings file. To load these settings to the procedure window, click **Open Example Settings File** in the Help Center or File menu.

Design Tab	
Factor 1 Values (A)	1 2 3
Factor 2 Values (B)	1 2 3 4
Factor 3 Values (C)	Nested 3
Store Data on Spreadsheet	Checked
Store First Factor In	1

Output

Click the Calculate button to perform the calculations and generate the following output.

Three-by-Four Design with Three Replicates

Experimental Design

Row	Factor 1	Factor 2	Factor 3
1	1	1	1
2	1	1	2
3	1	1	3
4	1	2	4
5	1	2	5
6	1	2	6
7	1	3	7
8	1	3	8
9	1	3	9
10	1	4	10
11	1	4	11
12	1	4	12
13	2	1	13
14	2	1	14
15	2	1	15
16	2	2	16
17	2	2	17
18	2	2	18
19	2	3	19
20	2	3	20
21	2	3	21
22	2	4	22
23	2	4	23
24	2	4	24
25	3	1	25
26	3	1	26
27	3	1	27
28	3	2	28
29	3	2	29
30	3	2	30
31	3	3	31
32	3	3	32
33	3	3	33
34	3	4	34
35	3	4	35
36	3	4	36

The values were also produced on the spreadsheet.

These values are also generated on the spreadsheet.

Example 2 – Randomized Block Design

This section presents an example of how to degenerate a randomized block design with three blocks and four treatments. To run this example, take the following steps. **CAUTION: since the purpose of this routine is to generate data, you should always begin with an empty output spreadsheet.**

Setup

If the procedure window is not already open, use the PASS Home window to open it. The parameters for this example are listed below and are stored in the **Example 2** settings file. To load these settings to the procedure window, click **Open Example Settings File** in the Help Center or File menu.

Design Tab

Factor 1 Values (A) **1 2 3**
 Factor 2 Values (B) **A B C D**
 Store Data on Spreadsheet **Checked**
 Store First Factor In **1**

Output

Click the Calculate button to perform the calculations and generate the following output.

Randomized Block Design

Experimental Design

Row	Factor 1	Factor 2
1	1	A
2	1	B
3	1	C
4	1	D
5	2	A
6	2	B
7	2	C
8	2	D
9	3	A
10	3	B
11	3	C
12	3	D

The values were also produced on the spreadsheet.

It is important to remember that when you use this design, you must randomly assign treatments to the four letters and randomly assign the physical blocks to the three block numbers.

Example 3 – Repeated Measures Design

This section presents an example of how to degenerate a repeated measures design with three groups, two individuals per group, and two treatments which we will label 'Pre' and 'Post.' To run this example, take the following steps. **CAUTION: since the purpose of this routine is to generate data, you should always begin with an empty output spreadsheet.**

Setup

If the procedure window is not already open, use the PASS Home window to open it. The parameters for this example are listed below and are stored in the **Example 3** settings file. To load these settings to the procedure window, click **Open Example Settings File** in the Help Center or File menu.

Design Tab

Factor 1 Values (A) **1 2 3**
 Factor 2 Values (B) **Nested 2**
 Factor 3 Values (C) **Pre Post**
 Store Data on Spreadsheet **Checked**
 Store First Factor In **1**

Output

Click the Calculate button to perform the calculations and generate the following output.

Repeated Measures Design

Experimental Design

Row	Factor 1	Factor 2	Factor 3
1	1	1	Pre
2	1	1	Post
3	1	2	Pre
4	1	2	Post
5	2	3	Pre
6	2	3	Post
7	2	4	Pre
8	2	4	Post
9	3	5	Pre
10	3	5	Post
11	3	6	Pre
12	3	6	Post

The values were also produced on the spreadsheet.