DOCUMENT RESUME

ED 352 028 IR 015 866

AUTHOR MacFarland, Thomas W.; Hou, Cheng-I
TITLE A Tutorial for the Student Edition (Release 1.1) of Minitab.
INSTITUTION Nova Univ., Fort Lauderdale, FL. Center for Computer and Information Sciences.
PUB DATE Dec 89
NOTE 56p.; For related materials, see IR 015 861-865. The disk provided with the original document is not included in this document.
PUB TYPE Guides - Classroom Use - Instructional Materials (For Learner) (051)

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS Analysis of Variance; Chi Square; *Computer Assisted Instruction; *Computer Software; Correlation; Higher Education; Microcomputers; *Statistical Analysis; *Statistics; Study Guides
IDENTIFIERS *Minitab II Programing Language

ABSTRACT

This guide for using Minitab requires DOS version 2.0 or greater, 512K RAM memory, two double-sided diskette drives, and a graphics monitor. Topics covered in the tutorial are Getting started; Installation; Making a data diskette; Entering data; Central tendency and dispersion; t-test; Chi-square test; Oneway ANOVA test; Twoway ANOVA test; and Install student edition of Minitab on hard disk. Six appendices contain sample printouts from the tutorial. (Contains 3 references.) (ALF)

A TUTORIAL FOR THE STUDENT EDITION (RELEASE 1.1) OF MINITAB

Thomas W. MacFarland, Ed.D

Cheng - I Hou, M.S.

Nova University

Center For Computer and Information Sciences

Fort Lauderdale, Florida 33314

December, 1989

A TUTORIAL FOR THE STUDENT EDITION (RELEASE 1.1) OF MINITAB

Thomas W. MacFarland, Ed.D
Cheng - I Hou, M.S.

Nova University
Center For Computer and Information Sciences
Fort Lauderdale, Florida 33314

December, 1989

USE OF MINITAB

The student Edtion of Minitab requires: DOS version 2.0 or greater, 512K RAM Memory, two double-sided diskette drives, and a monochrome or color graphics monitor. Both the student edition and the regular version of Minitab are personalized rather than copy protected, therefor Minitab will not run until it has been personalized or installed.

To prepare a data diskette for a floppy-based system (two 5.25-inch disk drive), follow the steps in "Getting started."

Getting started

Place the DOS diskette into drive A.

Turn on the machine.

```
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+      Note: The 'A>' and 'C>' prompt indicates DOS commands.      +
+            The 'MTB >' prompt indicates Minitab commands.       +
+            The 'DATA>' prompt indicates Minitab data input.     +
+            The 'SUBC>' prompt indicates Minitab subcommands.    +
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

Installation

Step 1, after the machine has been turned on, remove the DOS diskette and insert Minitab DISK A in drive A.

Step 2, type:

A> minstall

At this point you will see a Minitab installation screen.

Step 3, use an up or down arrow key to select Personalize Minitab and press the ENTER key.

Step 4, type your name or however you wish to personalize the disk.

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+  Note: The personalization process will work only one time.      +
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

Step 5, use an arrow key to exit from MINSTALL by selecting the 'eXit to DOS' option.

At this point, you will go back to "A>", the A prompt.

Making a data diskette

Step 1, after the machine has been turned on and is at the "A>" prompt insert a DOS diskette (2.0 or greater) in drive A.

Step 2, place a new diskette in drive B.

Step 3, type:

```
A> format b:        << This will format the disk. >>
```

Now you have created a data diskette that can store Minitab data. You will not need to create another data diskette until the diskette capacity is exceeded.

Entering Data

This section will deal with entering data for the following scenario.

Scenario: A comparison of semester grades (i.e., test scores) for five students in an Introduction to Statistics course. Students and test scores follow:

Tom	Bob	Roy	Sue	Bea
089	091	081	081	083
091	081	071	089	100

091	065	045	081	092
082	071	062	079	081
072	067	091	085	094

Data represent scores on 100-point tests.

Names are not real.

Task: Determine measures of central tendency and dispersion for each student. Be sure to include:

1. Mean grade
2. Median grade
3. Variance
4. Standard deviation

Place:

DOS diskette in drive A.
Minitab data diskette in drive B.

Turn on the machine.

You will now receive instructions on how to make a file called grade.mtw. This is a system file and it is not in ASCII format.

Step 1, remove the DOS disk from drive A.

Step 2, insert Minitab DISK A in drive A.

Step 3, type:

A> MINITAB << This will start the Minitab program. >>

At this point the system will ask for Minitab DISK 1. Minitab will tell you when to change disks with a message like:

* NOTE * please insert MINITAB DISK 1.
Press <ENTER> to continue or '.' to quit Minitab ==>

Step 4,

place Minitab DISK 1 in drive A and press

the ENTER key.

At this point the screen will give you some messages and the Minitab prompt will appear, waiting for action.

Step 5, type:

```
MTB > READ C1-C5                  << Press "Enter" and >>
DATA> 089 091 081 081 083         << continue with     >>
DATA> 091 081 071 089 100         << data input. There >>
DATA> 091 065 045 081 092         << must be at least  >>
DATA> 082 071 062 079 081         << one space between >>
DATA> 072 067 091 085 094         << columns.          >>
DATA> END
```

You will then automatically go back to "MTB >", the Minitab prompt.

Step 6, name the columns by typing:

```
MTB > NAME C1 'Tom' C2 'Bob' C3 'Roy' C4 'Sue' C5 'Bea'
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+     Note: Column names must always be enclosed in single           +
+           quotation marks.                                         +
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

Step 7, type:

```
MTB > SAVE 'B:GRADE'   << This will save data into a >>
                       << file called "grade.mtw".   >>
                       << The ".MTW" extension is    >>
                       << automatically added to the >>
                       << file name.                 >>
```

Then press the enter key.

At this point you will receive a message like:

```
Worksheet saved into file: B:GRADE.MTW
```

Step 8, type:

```
MTB > STOP    << This is the command to exit Minitab. >>
```

==========
= Central Tendency and Dispersion =
==========

Assuming that you are at the DOS prompt, place Minitab DISK A in drive A and your data diskette in drive B.

Step 1, at the DOS prompt, type:

```
A> MINITAb      << This will start the Minitab program. >>
```

At this point the system will ask for Minitab DISK 1. Minitab will tell you when to change disks with a message like:

```
* NOTE * please insert MINITAB DISK 1.
Press <ENTER> to continue or '.' to quit Minitab ==>
```

Step 2, type:

```
MTB > RETRIEVE 'B:GRADE'
```

This command retrieves the saved worksheet 'GRADE.MTW' into the current worksheet. At this point, the system will give a message like:

```
WORKSHEET SAVED 11/26/1989

Worksheet retrieved from file: B:GRADE.MTW
```

++
+ Note: The date will reflect the date the file was created, +
+ or last changed. +
++

Step 3, type:

```
MTB > OUTFILE 'B:GRADE'  << This will store all of your >>
                         << commands and Minitab's      >>
                         << responses, just as they     >>
                         << appear on your screen, into >>
                         << a file called "GRADE.LIS".  >>
                         << The extension, ".LIS", is   >>
                         << automatically added to the  >>
```

```
                                << file name when you type      >>
                                << OUTFILE.                     >>
```

At this point, the system will create a file called GRADE.LIS and write everything showing on the screen into that file.

Step 4:

```
        MTB > DESCRIBE C1 C2 C3 C4 C5
```

You now have a table with all descriptive statistics.

Step 5, type:

```
        MTB > NOOUTFILE  << This is the command to   >>
                         << stop recording and close >>
                         << "GRADE.LIS" file.        >>
```

Step 6, type:

```
        MTB > STOP       << This is the command to exit >>
                         << Minitab.                    >>
```

You are now back to the DOS prompt.

Step 7, type:

```
        A> type b:grade.lis  << This will print the file  >>
                             << "grade.lis" to paper.     >>
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+ Note: Press the Ctrl key down and also the p key to direct+
+       the file to the printer. After you do this routine, +
+       take your fingers off the keys. Then, press the     +
+       return key. The file will now print at the printer. +
+                                                           +
+       Press the Ctrl key down and also the p key to turn  +
+       off the printer at the end of printing.             +
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

The following is the result for this example.

	N	MEAN	MEDIAN	TRMEAN	STDEV	SEMEAN
Tom	5	85.00	89.00	85.00	8.15	3.65
Bob	5	75.00	71.00	75.00	10.86	4.86
Roy	5	70.00	71.00	70.00	17.69	7.91
Sue	5	83.00	81.00	83.00	4.00	1.79

Bea	5	90.00	92.00	90.00	7.91	3.54

	MIN	MAX	Q1	Q3
Tom	72.00	91.00	77.00	91.00
Bob	65.00	91.00	66.00	86.00
Roy	45.00	91.00	53.50	86.00
Sue	79.00	89.00	80.00	87.00
Bea	81.00	100.00	82.00	97.00

==========
= t-test =
==========

Assuming that you are comfortable with entering data, you can go directly to the t-test routine. The following are the data for the file shift.mtw, a study of absenteeism (Days_Off) of factory workers on day and night shift (Shift1 and Shift2).

	C1	C2	C3
ROW	ID	Shift	Days_Off
1	1	1	21
2	2	1	10
3	3	1	14
4	4	1	33
5	5	1	7
6	6	1	2
7	7	1	19
8	8	1	6
9	9	1	4
10	10	1	12
11	11	2	13
12	12	2	5
13	13	2	16
14	14	2	0
15	15	2	7
16	16	2	18
17	17	2	17
18	18	2	3
19	19	2	24
20	20	2	1

Review "Entering Data" if you need assistance with the

process of data input.

Step 1, at the DOS prompt, type:

```
A> MINITAB      << This will start the Minitab program. >>
```

At this point the system will ask for Minitab DISK 1. Minitab will tell you when to change disks with a message like:

```
* NOTE * please insert MINITAB DISK 1.
Press <ENTER> to continue or '.' to quit Minitab ==>
```

Step 2, type:

```
MTB > RETRIEVE 'B:SHIFT'
```

This command retrieves the saved worksheet 'SHIFT.MTW' into the current worksheet. At this point, the system will give a message like:

```
WORKSHEET SAVED 11/26/1989

Worksheet retrieved from file: B:SHIFT.MTW
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+    Note: The date will reflect the date the file was created, +
+          or last changed.                                      +
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

Step 3, type:

```
MTB > OUTFILE 'B:SHIFT' << This will store all of your >>
                        << commands and Minitab's      >>
                        << responses, just as they     >>
                        << appear on your screen, into >>
                        << a file called "SHIFT.LIS".  >>
```

At this point, the system will create a file called SHIFT.LIS and write everything showing on the screen into that file.

Step 4:

```
MTB > TWOT C3 C2   << This is the command for a      >>
                   << "two sample" t-test. Measured >>
                   << data are in C3 and groups are >>
                   << in C2. Employee ID numbers    >>
                   << are in C1.                    >>
```

At this point the system will ask for the Minitab DISK 2. Minitab will tell you when to change disks with a message like:

```
* NOTE * please insert MINITAB DISK 2.
Press <ENTER> to continue or '.' to quit Minitab ==>
```

You now have a table with t-test values.

Step 5, type:

```
MTB > NOOUTFILE   << This is the command to    >>
                  << stop recording and close  >>
                  << "SHIFT.LIS" file.         >>
```

Step 6, type:

```
MTB > STOP        << This is the command to exit >>
                  << Minitab.                    >>
```

You are now back to the DOS prompt.

Step 7, type:

```
A> type b:shift.lis   << This will print the file >>
                      << "shift.lis" to paper.    >>
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+ Note: Press the Ctrl key down and also the p key to direct+
+       the file to the printer. After you do this routine, +
+       take your fingers off the keys. Then, press the     +
+       return key. The file will now print at the printer. +
+                                                           +
+       Press the Ctrl key down and also the p key to turn  +
+       off the printer at the end of printing.             +
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

The following is the result for this example.

```
TWOSAMPLE T FOR Days_Off
Shift    N      MEAN      STDEV    SE MEAN
1       10     12.80       9.41        3.0
```

```
2       10      10.40       8.28        2.6

95 PCT CI FOR MU 1 - MU 2: (-6.0, 10.8)

TTEST MU 1 = MU 2 (VS NE): T= 0.61   P=0.55   DF=  17
```

= Chi-Square test =

This analysis is based on the following scenario:

Rows = Eyes	Columns = Hair: Light=1	Dark=2
Light=1	(a) n = 31	(b) n = 21
Dark=2	(c) n = 14	(d) n = 34

Thus, you will have:

31 entries coded 1 1 (light eyes and light hair)
21 entries coded 1 2 (light eyes and dark hair)
14 entries coded 2 1 (dark eyes and light hair)
34 entries coded 2 2 (dark eyes and dark hair).

The following is how to input the data for this chi-square example into a file called color.mtw.

```
MTB > READ C1 C2
DATA> 31 21
DATA> 14 34
DATA> END

MTB > NAME C1 'Eyes' C2 'Hair'
MTB > SAVE 'B:COLOR'
```

Step 1, at the DOS prompt, type:

```
A> MINITAB      << This will start the Minitab program. >>
```

At this point the system will ask for Minitab DISK 1. Minitab will tell you when to change disks with a message like:

```
* NOTE * please insert MINITAB DISK 1.
Press <ENTER> to continue or '.' to quit Minitab ==>
```

Step 2, type:

```
MTB > RETRIEVE 'B:COLOR'
```

This command retrieves the saved worksheet 'COLOR.MTW' into the current worksheet. At this point, the system will give a message like:

```
WORKSHEET SAVED 11/26/1989

Worksheet retrieved from file: B:COLOR.MTW
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+    Note: The date will reflect the date the file was created,    +
+          or last changed.                                        +
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

Step 3, type:

```
MTB > OUTFILE 'B:COLOR'  << This will store all of your >>
                         << commands and Minitab's       >>
                         << responses, just as they      >>
                         << appear on your screen, into  >>
                         << a file called "COLOR.LIS".   >>
```

At this point, the system will create a file called COLOR.LIS and write everything showing on the screen into that file.

Step 4:

```
MTB > CHISQUARE C1 C2
```

At this point the system will ask for Minitab DISK 2. Minitab will tell you when to change disks with a message like:

```
* NOTE * please insert MINITAB DISK 2.
Press <ENTER> to continue or '.' to quit Minitab ==>
```

You now have a table with Chi-Square test values.

Step 5, type:

```
MTB > NOOUTFILE   << This is the command to   >>
                  << stop recording and close >>
                  << "COLOR.LIS" file.        >>
```

Step 6, type:

```
MTB > STOP        << This is the command to exit >>
                  << Minitab.                    >>
```

You are now back to the DOS prompt.

Step 7, type:

```
A> type b:color.lis   << This will print the file >>
                      << "color.lis" to paper.    >>
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+ Note: Press the Ctrl key down and also the p key to direct+
+       the file to the printer. After you do this routine, +
+       take your fingers off the keys. Then, press the     +
+       return key. The file will now print at the printer. +
+                                                           +
+       Press the Ctrl key down and also the p key to turn  +
+       off the printer at the end of printing.             +
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

The following is the result for this example.

Expected counts are printed below observed counts

	Eyes	Hair	Total
1	31	21	52
	23.40	28.60	
2	14	34	48
	21.60	26.40	
Total	45	55	100

```
ChiSq =  2.468 +  2.020 +
         2.674 +  2.188 = 9.350
df = 1
```

Do not be confused by the placement of "Eyes." This placement is for rows, even though it looks out of place.

```
======================
= Oneway ANOVA test =
======================
```

Assuming that you are comfortable with entering the data you can go directly to the Oneway ANOVA test routine. The following are the data for the file gpa.mtw, a study of four groups of students (C1) and associated GPAs (C2).

	C1	C2
ROW	Group	GPA
1	1	2.87
2	1	2.16
3	1	3.14
4	1	2.51
5	1	1.80
6	1	3.01
7	1	2.16
8	2	3.23
9	2	3.45
10	2	3.67
11	2	2.87
12	2	3.77
13	3	2.61
14	3	3.56
15	3	2.97
16	3	2.33
17	3	3.64
18	3	2.67
19	3	3.31
20	3	3.01
21	4	2.25
22	4	3.13
23	4	2.44

```
24      4   3.27
25      4   2.81
26      4   1.36
27      4   2.70
28      4   2.41
```

Review "Entering Data" if you need assistance with the process of data input.

Step 1, at the DOS prompt, type:

```
A> MINITAB     << This will start the Minitab program. >>
```

At this point the system will ask for Minitab DISK 1. Minitab will tell you when to change disks with a message like:

```
* NOTE * please insert MINITAB DISK 1.
Press <ENTER> to continue or '.' to quit Minitab ==>
```

Step 2, type:

```
MTB > RETRIEVE 'B:GPA'
```

This command retrieves the saved worksheet 'GPA.MTW' into the current worksheet. At this point, the system will give a message like:

```
WORKSHEET SAVED 11/30/1989

Worksheet retrieved from file: B:GPA.MTW
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++ ++++++
+    Note: The date will reflect the date the file was created, +
+          or last changed.                                     +
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

Step 3, type:

```
MTB > OUTFILE 'B:GPA'    << This will store all of your >>
                         << commands and Minitab's      >>
```

```
                    << responses, just as they      >>
                    << appear on your screen, into  >>
                    << a file called "GPA.LIS".     >>
```

At this point, the system will create a file called GPA.LIS and write everything showing on the screen into that file.

Step 4:

```
MTB > ONEWAY C2 C1 << This is the command for a      >>
                   << Oneway ANOVA test. Measured    >>
                   << data are in C2 and groups are  >>
                   << in C1.                         >>
```

At this point the system will ask for the Minitab DISK 2. Minitab will tell you when to change disks with a message like:

```
* NOTE * please insert MINITAB DISK 2.
Press <ENTER> to continue or '.' to quit Minitab ==>
```

You now have a table with Oneway ANOVA test values.

Step 5, type:

```
MTB > NOOUTFILE  << This is the command to    >>
                 << stop recording and close  >>
                 << "GPA.LIS" file.           >>
```

Step 6, type:

```
MTB > STOP       << This is the command to exit >>
                 << Minitab.                    >>
```

You are now back to the DOS prompt.

Step 7, type:

```
A> type b:gpa.lis   << This will print the file >>
                    << "gpa.lis" to paper.      >>
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+ Note: Press the Ctrl key down and also the p key to direct+
+       the file to the printer. After you do this routine, +
+       take your fingers off the keys. Then, press the     +
+       return key. The file will now print at the printer. +
+                                                           +
+       Press the Ctrl key down and also the p key to turn  +
```

+ off the printer at the end of printing. +
++

The following is the result for this example.

```
ANALYSIS OF VARIANCE ON GPA
SOURCE      DF         SS          MS          F          p
Group        3      3.190       1.063       4.21      0.016
ERROR       24      6.058       0.252
TOTAL       27      9.428

                                        INDIVIDUAL 95 PCT CI'S FOR MEAN
                                        BASED ON POOLED STDEV
LEVEL   N     MEAN    STDEV   --------+---------+---------+--------
    1   7   2.5214   0.5041    (------*--------)
    2   5   3.3980   0.3613                      (--------*--------)
    3   8   3.0125   0.4674                 (------*-------)
    4   8   2.5463   0.5955    (------*------)
                               --------+---------+---------+--------
POOLED STDEV =    0.5024              2.50      3.00      3.50
```

==========
= Twoway ANOVA test =
==========

This analysis is based on the following scenario:

Scenario: A study on the effect of type of golf club and type of golf ball on distance of hit.

		Brand			
		A	B	C	D
Club	Driver	226.4	238.3	240.5	219.8
		232.6	231.7	246.9	228.7
		234.0	227.7	240.3	232.9
		220.7	237.2	244.7	237.6
	Five-Iron	163.8	184.4	179.0	157.8
		179.4	180.6	168.0	161.8

168.6	179.5	165.2	162.1
173.4	186.2	156.5	160.3

Ho: There is no difference between golf clubs (driver and five-iron) and golf balls (Brands A, B, C, and D) and the distance of hit.

The following are the data for the file golf.mtw.

	C1	C2	C3
ROW	Club	Ball	Distance
1	1	1	226.4
2	1	1	232.6
3	1	1	234.0
4	1	1	220.7
5	1	2	238.3
6	1	2	231.7
7	1	2	227.7
8	1	2	237.2
9	1	3	240.5
10	1	3	246.9
11	1	3	240.3
12	1	3	244.7
13	1	4	219.8
14	1	4	228.7
15	1	4	232.9
16	1	4	237.6
17	2	1	163.8
18	2	1	179.4
19	2	1	168.6
20	2	1	173.4
21	2	2	184.4
22	2	2	180.6
23	2	2	179.5
24	2	2	186.2
25	2	3	179.0
26	2	3	168.0
27	2	3	165.2
28	2	3	156.5
29	2	4	157.8
30	2	4	161.8
31	2	4	162.1
32	2	4	160.3

Review "Entering Data" if you need assistance with the

process of data input.

Step 1, at the DOS prompt, type:

```
A> MINITAB      << This will start the Minitab program. >>
```

At this point the system will ask for Minitab DISK 1. Minitab will tell you when to change disks with a message like:

```
* NOTE * please insert MINITAB DISK 1.
Press <ENTER> to continue or '.' to quit Minitab ==>
```

Step 2, type:

```
MTB > RETRIEVE 'B:GOLF'
```

This command retrieves the saved worksheet 'GOLF.MTW' into the current worksheet. At this point, the system will give a message like:

```
WORKSHEET SAVED 11/30/1989

Worksheet retrieved from file: B:GOLF.MTW
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+    Note: The date will reflect the date the file was created,    +
+          or last changed.                                        +
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

Step 3, type:

```
MTB > OUTFILE 'B:GOLF'  << This will store all of your >>
                        << commands and Minitab's      >>
                        << responses, just as they     >>
                        << appear on your screen, into >>
                        << a file called "GOLF.LIS".   >>
```

At this point, the system will create a file called GOLF.LIS and write everything showing on the screen into that file.

Step 4:

```
MTB > TWOWAY C3 C1 C2   << This is the command for a   >>
                        << Twoway ANOVA test. Measured >>
                        << data are in C3 and groups   >>
                        << are in C1 and C2.           >>
```

At this point the system will ask for the Minitab DISK 2. Minitab will tell you when to change disks with a message like:

```
* NOTE * please insert MINITAB DISK 2.
Press <ENTER> to continue or '.' to quit Minitab ==>
```

The following procedures are used to compute the appropriate F statistics and corresponding p-values for this example.

Step 5, type:

```
MTB > let k1=255.3/34.3      << Compute the interaction >>
                             << F statistic.            >>
MTB > cdf k1 k2;             << Compute the interaction >>
SUBC> f 3 24.                << p-value.                >>
MTB > let k2=1-k2
MTB > print k1 k2            << Print interaction F and >>
K1        7.44315            << p-value.                >>
K2        0.00108641
```

Step 6, type:

```
MTB > let k3=32093.1/34.3    << Compute the Club >>
                             << F statistic.    >>
MTB > cdf k3 k4;             << Compute the Club >>
SUBC> f 1 24.                << p-value.         >>
MTB > let k4=1-k4
MTB > print k3 k4            << Print Club F and >>
K3        935.659            << p-value.         >>
K4        0
```

Step 7, type:

```
MTB > let k5=266.9/34.3      << Compute the Ball >>
                             << F statistic.    >>
MTB > cdf k5 k6;             << Compute the Ball >>
SUBC> f 3 24.                << p-value.         >>
MTB > let k6=1-k6
MTB > print k5 k6            << Print Ball F and >>
K5        7.78134            << p-value.         >>
K6        0.000845969
```

You now have a table with Twoway ANOVA test values.

Step 8, type:

```
MTB > NOOUTFILE  << This is the command to   >>
                 << stop recording and close >>
                 << "GOLF.LIS" file.         >>
```

Step 9, type:

```
MTB > STOP       << This is the command to exit >>
                 << Minitab.                    >>
```

You are now back to the DOS prompt.

Step 10, type:

```
A> type b:golf.lis   << This will print the file  >>
                     << "golf.lis" to paper.      >>
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+ Note: Press the Ctrl key down and also the p key to direct+
+       the file to the printer. After you do this routine, +
+       take your fingers off the keys. Then, press the     +
+       return key. The file will now print at the printer. +
+                                                           +
+       Press the Ctrl key down and also the p key to turn  +
+       off the printer at the end of printing.             +
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

The following is the result for this example.

ANALYSIS OF VARIANCE Distance

SOURCE	DF	SS	MS
Club	1	32093.1	32093.1
Ball	3	800.7	266.9
INTERACTION	3	766.0	255.3
ERROR	24	822.2	34.3
TOTAL	31	34482.0	

```
==================================================
= Install Student Edition of Minitab on hard disk =
==================================================
```

Step 1, turn on the machine and insert Minitab DISK A in drive A.

Step 2, type:

```
C> a:          << This is the command to >>
               << make the A: drive the  >>
               << default drive.         >>
```

At this point you will go to A: prompt.

Step 3, type:

```
A> MINSTALL
```

At this point you will see a Minitab installation screen.

Step 4, use an arrow key to select Personalize Minitab and press the ENTER key.

Step 5, type your name or however you wish to personalize the disk.

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+  Note: The personalization process will work only one time.      +
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

After you have personalized Minitab, you are ready to transfer Minitab files to the hard disk.

Step 6, use an arrow key to select the Transfer option and insert diskettes as requested.

After you install the C1 disk the system will give you messages about the other disks.

At this point, MINSTALL will automatically create a directory called "MINITAB" on the root directory and create a data subdirectory under MINITAB directory for saving data.

Step 7, Exit from MINSTALL by selecting the 'eXit to DOS' option.

REFERENCES

Joseph, M. L., and Joseph, W. D. (1979). Research Fundamentals in Home Economics. Redondo Beach, California. ISBN 0-8087-3415-6

McClave, J. T., & Dietrich, F. H. (1985). Statistics (3rd ed.). San Francisco, California, Dellen Publishing Company. ISBN 0-02-378760-0

Schaefer, R. L., & Anderson, R. B. (1989). The Student Edition of MINITAB. Reading, Massachusetts, Addison-Wesley Publishing Company. ISBN 0-201-50533-9

APPENDIX A

```
MTB > # Schaefer and Anderson (1989:49-66)
MTB > #
MTB > # Data Manipulation, Editing, and Transformation
MTB > #
MTB > RETRIEVE 'B:SAMPLE_0.MTW'
  WORKSHEET SAVED 12/10/1989

Worksheet retrieved from file: B:SAMPLE_0.MTW
MTB > #
MTB > INFO

COLUMN     NAME       COUNT
C1         Grade 10      10
C2         Grade 11      10
C3         Grade 12      10

CONSTANTS USED: NONE

MTB > #
MTB > PRINT C1-C3

 ROW  Grade 10  Grade 11  Grade 12

   1        10        13        21
   2         9         9        17
   3        14        17        15
   4        15        21        14
   5         8        17        25
   6        12        15        25
   7        14         9        27
   8        17        16        18
   9        20        19        21
  10        13        23        22

MTB > #
MTB > # Correct individual entries by using LET.
MTB > #
MTB > PRINT C1

Grade 10
   10      9     14     15      8     12     14     17     20     13


MTB > #
MTB > LET C1 (1) = 20
MTB > #
MTB > PRINT C1

Grade 10
   20      9     14     15      8     12     14     17     20     13

MTB > #
```

```
MTB > # Now, change the datum back to the original value.
MTB > #
MTB > LET C1 (1) = 10
MTB > #
MTB > PRINT C1

Grade 10
   10      9     14     15      8     12     14     17     20     13

MTB > #
MTB > # It is also possible to create new values of existing data.
MTB > # Hint:  Place new values in a newly created column.
MTB > #
MTB > INFO

COLUMN     NAME       COUNT
C1         Grade 10      10
C2         Grade 11      10
C3         Grade 12      10

CONSTANTS USED: NONE

MTB > #
MTB > LET C4 = C3 + 5.5
MTB > NAME C4 'New G_12'
MTB > #
MTB > INFO

COLUMN     NAME       COUNT
C1         Grade 10      10
C2         Grade 11      10
C3         Grade 12      10
C4         New G_12      10

CONSTANTS USED: NONE


MTB > #
MTB > PRINT C1-C4

 ROW  Grade 10  Grade 11  Grade 12  New G_12

   1        10        13        21      26.5
   2         9         9        17      22.5
   3        14        17        15      20.5
   4        15        21        14      19.5
   5         8        17        25      30.5
   6        12        15        25      30.5
   7        14         9        27      32.5
   8        17        16        18      23.5
   9        20        19        21      26.5
  10        13        23        22      27.5
```

```
MTB > #
MTB > # It is also possible to erase a column of data that
MTB > # is no longer needed.
MTB > #
MTB > ERASE C4
MTB > #
MTB > PRINT C1-C4

 ROW  Grade 10  Grade 11  Grade 12    C4

   1        10        13        21
   2         9         9        17
   3        14        17        15
   4        15        21        14
   5         8        17        25
   6        12        15        25
   7        14         9        27
   8        17        16        18
   9        20        19        21
  10        13        23        22

MTB > # So far, all calculations have been "by column."
MTB > # As an example, look at the average value of data
MTB > # found in C1.
MTB > #

MTB > MEAN C1
   MEAN      =       13.200
MTB > #
MTB > # It is also possible to calculate values "by row."
MTB > #
MTB > RMEAN of C1-C3 store in C4
MTB > #
MTB > INFO

COLUMN     NAME       COUNT
C1         Grade 10      10
C2         Grade 11      10
C3         Grade 12      10
C4                       10

CONSTANTS USED: NONE

MTB > # Notice how C4 is listed, but that a name does not appear.
MTB > #
MTB > NAME C4 'Mean/Row'
MTB > #
MTB > INFO

COLUMN     NAME       COUNT
C1         Grade 10      10
```

```
C2          Grade 11      10
C3          Grade 12      10
C4          Mean/Row      10

CONSTANTS USED: NONE

MTB > #
MTB > PRINT C1-C4

 ROW   Grade 10   Grade 11   Grade 12   Mean/Row

   1         10         13         21    14.6667
   2          9          9         17    11.6667
   3         14         17         15    15.3333
   4         15         21         14    16.6667
   5          8         17         25    16.6667
   6         12         15         25    17.3333
   7         14          9         27    16.6667
   8         17         16         18    17.0000
   9         20         19         21    20.0000
  10         13         23         22    19.3333


MTB > #
MTB > # The data in C4 are not needed.
MTB > #
MTB > ERASE C4
MTB > #
MTB > INFO

COLUMN     NAME        COUNT
C1         Grade 10       10
C2         Grade 11       10
C3         Grade 12       10

CONSTANTS USED: NONE

MTB > #
MTB > PRINT C1-C4

 ROW   Grade 10   Grade 11   Grade 12    C4

   1         10         13         21
   2          9          9         17
   3         14         17         15
   4         15         21         14
   5          8         17         25
   6         12         15         25
   7         14          9         27
   8         17         16         18
   9         20         19         21
  10         13         23         22
```

```
MTB > #
MTB > # Frequently used calculations can be stored for later
MTB > # use by using constants.
MTB > #
MTB > MEAN of C1 store in K1
   MEAN     =       13.200
MTB > MEAN of C2 store in K2
   MEAN     =       15.900
MTB > MEAN of C3 store in K3
   MEAN     =       20.500
MTB > PRINT K1 K2 K3
K1         13.2000
K2         15.9000
K3         20.5000

MTB > #
MTB > # Data can also be altered in many other ways.
MTB > #
MTB > # It is often helpful to delete an entire row of data.
MTB > #
MTB > PRINT C1-C3

 ROW  Grade 10  Grade 11  Grade 12

   1        10        13        21
   2         9         9        17
   3        14        17        15
   4        15        21        14
   5         8        17        25
   6        12        15        25
   7        14         9        27
   8        17        16        18
   9        20        19        21
  10        13        23        22

MTB > #
MTB > # In this example, delete:
MTB > #
MTB > # A.  rows 3 6 8 9 ..... of C1-C2
MTB > #
MTB > # B.  rows 1 2 4 ..... of C3
MTB > #
MTB > DELETE rows 3, 6, 8, 9 of C1-C2
MTB > PRINT C1-C3

 ROW  Grade 10  Grade 11  Grade 12

   1        10        13        21
   2         9         9        17
   3        15        21        15
   4         8        17        14
```

```
   5         14          9         25
   6         13         23         25
   7                                27
   8                                18
   9                                21
  10                                22


MTB > DELETE rows 1, 2, 4 of C3
MTB > PRINT C1-C3

 ROW   Grade 10   Grade 11   Grade 12

   1         10         13         15
   2          9          9         25
   3         15         21         25
   4          8         17         27
   5         14          9         18
   6         13         23         21
   7                                22

MTB > #
MTB > # You can also "erase" the entire data set, and then
MTB > # retrieve the original data set to "start over" again.
MTB > #
MTB > DELETE rows 1, 2, 3, 4, 5, 6, 7 of C1-C3
Specified row exceeds column length
No rows deleted
MTB > #
MTB > But, you will notice that this job is slightly more complicated
* ERROR * NAME NOT FOUND IN DICTIONARY


MTB > # Well, notice what happens when you do not start a line
MTB > # of text without the # symbol.
MTB > #
MTB > DELETE rows 1, 2, 3, 4, 5, 6 of C1-C2
* ERROR * Use ERASE to DELETE or OMIT all rows in a column

MTB > # And, you should now see that an inappropriate command has
MTB > # been used.
MTB > #
MTB > PRINT C1-C3

 ROW   Grade 10   Grade 11   Grade 12

   1         10         13         15
   2          9          9         25
   3         15         21         25
   4          8         17         27
   5         14          9         18
   6         13         23         21
```

7 22

```
MTB > #
MTB > ERASE C1-C3
MTB > #
MTB > PRINT C1-C3

 ROW    C1    C2    C3

MTB > #
MTB > # You will notice that the columns are now empty.  The
MTB > # "mistakes" should be carefully reviewed so that you
MTB > # learn how to use error messages for later correction.
MTB > #
MTB > RETRIEVE 'B:SAMPLE_0.MTW'
 WORKSHEET SAVED 12/10/1989

Worksheet retrieved from file: B:SAMPLE_0.MTW
MTB > #
MTB > INFO

COLUMN     NAME       COUNT
C1         Grade 10      10
C2         Grade 11      10
C3         Grade 12      10

CONSTANTS USED: NONE

MTB > #
MTB > PRINT C1-C3

 ROW  Grade 10  Grade 11  Grade 12

   1        10        13        21
   2         9         9        17
   3        14        17        15
   4        15        21        14
   5         8        17        25
   6        12        15        25
   7        14         9        27
   8        17        16        18
   9        20        19        21
  10        13        23        22

MTB > #

MTB > PRINT K1 K2 K3
* ERROR * UNDEFINED CONSTANT

MTB > #
MTB > # Notice how the constant values were "lost" when the
```

```
MTB > # columns were erased.  Place values in a new location
MTB > # if you think that changes will cause later problems.
MTB > #
MTB > COPY the data in C3 to C4
MTB > #
MTB > NAME C4 'Copy_C3'
MTB > #
MTB > PRINT C1-C4

 ROW  Grade 10  Grade 11  Grade 12  Copy_C3

   1        10        13        21        21
   2         9         9        17        17
   3        14        17        15        15
   4        15        21        14        14
   5         8        17        25        25
   6        12        15        25        25
   7        14         9        27        27
   8        17        16        18        18
   9        20        19        21        21
  10        13        23        22        22

MTB > #
MTB > # Sometimes you may want to summarize data into group
MTB > # codes.  Here is an example of how to code data.
MTB > #
MTB > CODE (20:24) 1, (15:19) 2, (10:14) 3, (5:9) 4, &
CONT> (0:4) 5 in C2 store in C5
MTB > #
MTB > NAME C5 'Codes'
MTB > #
MTB > PRINT C1-C5

 ROW  Grade 10  Grade 11  Grade 12  Copy_C3  Codes

   1        10        13        21        21      3
   2         9         9        17        17      4
   3        14        17        15        15      2
   4        15        21        14        14      1
   5         8        17        25        25      2
   6        12        15        25        25      2
   7        14         9        27        27      4
   8        17        16        18        18      2
   9        20        19        21        21      2
  10        13        23        22        22      1

MTB > #
MTB > # Notice how the original data have been retained!
MTB > #
MTB > # Data can also be "moved about" in stacks.  This process
MTB > # is very helpful when data are saved in one manner, but
MTB > # a different organization scheme is needed for statistical
```

```
MTB > # analysis.
MTB > #
MTB > PRINT C1-C5

 ROW  Grade 10  Grade 11  Grade 12  Copy_C3  Codes

   1        10        13        21       21      3
   2         9         9        17       17      4
   3        14        17        15       15      2
   4        15        21        14       14      1
   5         8        17        25       25      2
   6        12        15        25       25      2
   7        14         9        27       27      4
   8        17        16        18       18      2
   9        20        19        21       21      2
  10        13        23        22       22      1

MTB > #
MTB > STACK C1 on C2 and store in C6
MTB > #
MTB > PRINT C1-C6

 ROW  Grade 10  Grade 11  Grade 12  Copy_C3  Codes     C6

   1        10        13        21       21      3     10
   2         9         9        17       17      4      9
   3        14        17        15       15      2     14
   4        15        21        14       14      1     15
   5         8        17        25       25      2      8
   6        12        15        25       25      2     12
   7        14         9        27       27      4     14
   8        17        16        18       18      2     17
   9        20        19        21       21      2     20
  10        13        23        22       22      1     13
  11                                                    13
  12                                                     9
  13                                                    17
  14                                                    21
  15                                                    17
  16                                                    15
  17                                                     9
  18                                                    16
  19                                                    19
  20                                                    23

MTB > #
MTB > # With the stack command and statistical analysis, it may
MTB > # be helpful to also generate subscripts to identify group
MTB > # membership.
MTB > #
MTB > STACK C1 on C3 store in C7;
SUBC> SUBSCRIPT in C8.
```

```
MTB > #
MTB > PRINT C1-C8
```

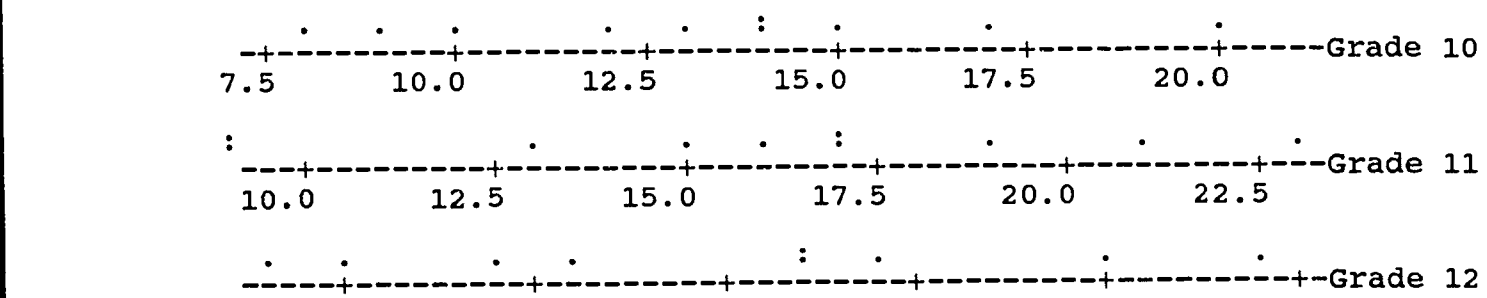
ROW	Grade 10	Grade 11	Grade 12	Copy_C3	Codes	C6	C7	C8
1	10	13	21	21	3	10	10	1
2	9	9	17	17	4	9	9	1
3	14	17	15	15	2	14	14	1
4	15	21	14	14	1	15	15	1
5	8	17	25	25	2	8	8	1
6	12	15	25	25	2	12	12	1
7	14	9	27	27	4	14	14	1
8	17	16	18	18	2	17	17	1
9	20	19	21	21	2	20	20	1
10	13	23	22	22	1	13	13	1
11						13	21	2
12						9	17	2
13						17	15	2
14						21	14	2
15						17	25	2
16						15	25	2
17						9	27	2
18						16	18	2
19						19	21	2
20						23	22	2

```
MTB > #
MTB > # There are many other useful data management features with
MTB > # Minitab.  Take the time to practice, and use the error
MTB > # messages to your best advantage.  Quite simply, use your
MTB > # own data and situations to learn about the useful features
MTB > # of Minitab.
MTB > #
MTB > # Thomas W. MacFarland, Ed.D.
MTB > #
MTB > # December, 1989
MTB > NOOUTFILE
```

APPENDIX B

```
MTB > # Schaefer and Anderson (1989:67-80)
MTB > #
MTB > # Displaying Data
MTB > #
MTB > RETRIEVE 'B:SAMPLE_0.MTW'
 WORKSHEET SAVED 12/10/1989

Worksheet retrieved from file: B:SAMPLE_0.MTW
MTB > #
MTB > INFO

COLUMN     NAME       COUNT
C1         Grade 10      10
C2         Grade 11      10
C3         Grade 12      10

CONSTANTS USED: NONE

MTB > #
MTB > PRINT C1-C3

 ROW  Grade 10  Grade 11  Grade 12

   1        10        13        21
   2         9         9        17
   3        14        17        15
   4        15        21        14
   5         8        17        25
   6        12        15        25
   7        14         9        27
   8        17        16        18
   9        20        19        21
  10        13        23        22

MTB > #
MTB > # Minitab can be used to visualize data in addition to
MTB > # statistical computations.
MTB > #
MTB > HISTOGRAM C1-C3

Histogram of Grade 10   N = 10

Midpoint   Count
       8       1  *
       9       1  *
      10       1  *
      11       0
      12       1  *
      13       1  *
      14       2  **
      15       1  *
      16       0
```

```
      17        1  *
      18        0
      19        0
      20        1  *


Histogram of Grade 11   N = 10

Midpoint   Count
      10        2  **
      12        0
      14        1  *
      16        2  **
      18        2  **
      20        1  *
      22        1  *
      24        1  *


Histogram of Grade 12   N = 10

Midpoint   Count
      14        1  *
      15        1  *
      16        0
      17        1  *
      18        1  *
      19        0
      20        0
      21        2  **
      22        1  *
      23        0
      24        0
      25        2  **
      26        0
      27        1  *

MTB > #
MTB > DOTPLOT C1-C3
```



```
    15.0       17.5       20.0       22.5       25.0       27.5


MTB > #
MTB > STEM-AND-LEAF C1-C3

Stem-and-leaf of Grade 10  N  = 10
Leaf Unit = 1.0

     2     0 89
     3     1 0
     5     1 23
     5     1 445
     2     1 7
     1     1
     1     2 0


Stem-and-leaf of Grade 11  N  = 10
Leaf Unit = 1.0

     2     0 99
     2     1
     3     1 3
     4     1 5
    (3)    1 677
     3     1 9
     2     2 1
     1     2 3


Stem-and-leaf of Grade 12  N  = 10
Leaf Unit = 1.0

     2     1 45
     3     1 7
     4     1 8
    (2)    2 11
     4     2 2
     3     2 55
     1     2 7

MTB > #
MTB > # Histograms and dotplots are quite common, but it may
MTB > # be to your benefit to learn more about stem-and-leaf
MTB > # display.
MTB > #
MTB > BOXPLOT C1-C3
* ERROR * 3 IS AN ILLEGAL NUMBER OF ARGUMENTS
```

```
MTB > BOXPLOT C1

          ---------------------
    --------I                +      I-------------------
          ---------------------
--+---------+---------+---------+---------+---------+----Grade 10
7.5       10.0      12.5      15.0      17.5      20.0

MTB > #
MTB > BOXPLOT C2

                ------------------------
----------------I              +       I---------------
                ------------------------
----+---------+---------+---------+---------+---------+--Grade 11
 10.0      12.5      15.0      17.5      20.0      22.5

MTB > #
MTB > BOXPLOT C3

              ---------------------------------
  ------------I                +                I--------
              ---------------------------------
------+---------+---------+---------+---------+---------+Grade 12
   15.0      17.5      20.0      22.5      25.0      27.5

MTB > #
MTB > # Notice how "BOXPLOT C1-C3" was not an acceptable command.
MTB > #
MTB > # Like stem-and-leaf display, it may be to your benefit to
MTB > # learn more about the use of boxplot for data display.
MTB > #
MTB > # So far, data have been restricted to the original scale
MTB > # of measurement.
MTB > #
MTB > # But, data from various columns can be visualized along
MTB > # the same scale by using the subcommand SAME.
MTB > #
MTB > DOTPLOT C1-C3;
SUBC> SAME.

 . . .   . . : .     .       .
-------+---------+---------+---------+---------+---------+---------Grade 10

   :          .     . . :   .     .       .
-------+---------+---------+---------+---------+---------+---------Grade 11
```

```
                  .  .    . .      :  .      :    .
-------+---------+---------+---------+---------+---------+---------Grade 12
     10.5      14.0      17.5      21.0      24.5      28.0

MTB > #
MTB > # There may be times when SAME can be used to your advantage.
MTB > #
MTB > # Minitab can also be used to plot data along an x and y axis.
MTB > #
MTB > PLOT C1 C3

    20.0+                                 *
        -
Grade 10-
        -
        -                     *
    16.0+
        -   *
        -       *                                           *
        -
        -                                   *
    12.0+                                                   *
        -
        -
        -                                   *
        -               *
     8.0+                                                   *
        -
       ------+---------+---------+---------+---------+---------+Grade 12
          15.0      17.5      20.0      22.5      25.0      27.5

MTB > # With "PLOT C1 C3" the x axis was C3 and the y axis was C1.
MTB > #
MTB > # See if there are differences with "PLOT C3 C1."
MTB > #
MTB > PLOT C3 C1

Grade 12-
        -                             *
        -
    25.0+     *               *
        -
        -
        -                     *
        -           *                                       *
    20.0+
        -
        -                                         *
        -       *
        -
    15.0+                                 *
```

```
                                        *
-
-
-
  --+---------+---------+---------+---------+---------+----Grade 10
  7.5       10.0      12.5      15.0      17.5      20.0

MTB > #
MTB > # Be sure to know in advance how you wish to represent
MTB > # the data.
MTB > #
MTB > # Other options include:
MTB > #
MTB > # 1.  MPLOT
MTB > #
MTB > # 2.  LPLOT
MTB > #
MTB > # 3.  TSPLOT
MTB > #
MTB > # Again, you need to practice with your own data to learn
MTB > # how Minitab can be used for data representation.
MTB > #
MTB > # Thomas W. MacFarland, Ed.D.
MTB > #

MTB > # December, 1989
MTB > NOOUTFILE
```

APPENDIX C

```
MTB > # Schaefer and Anderson (1989:121-135)
MTB > #
MTB > RETRIEVE 'B:SAMPLE_0.MTW'
 WORKSHEET SAVED 12/10/1989

Worksheet retrieved from file: B:SAMPLE_0.MTW
MTB > #
MTB > INFO

COLUMN     NAME       COUNT
C1         Grade 10      10
C2         Grade 11      10
C3         Grade 12      10

CONSTANTS USED: NONE

MTB > #
MTB > PRINT C1-C3

 ROW  Grade 10  Grade 11  Grade 12

   1        10        13        21
   2         9         9        17
   3        14        17        15
   4        15        21        14
   5         8        17        25
   6        12        15        25
   7        14         9        27
   8        17        16        18
   9        20        19        21
  10        13        23        22

MTB > #
MTB > CORRELATE the data in C1-C3, in a pairwise manner

        Grade 10 Grade 11
Grade 11  0.380
Grade 12 -0.225   -0.263

MTB > #
MTB > # Review correlation methodology, but basically you
MTB > # should see that there is minimal correlation between
MTB > # C1 and C3 and C2 and C3.
MTB > #
MTB > Notice, however, that there is a minimal degree of
* ERROR * NAME NOT FOUND IN DICTIONARY


MTB > # Well, well, well ... notice again what happens when a
MTB > # line of text does not begin with the # symbol.
MTB > #
MTB > # Notice, however, that there is a minimal degree of
```

```
MTB > # association between C1 and C2.  Use this association
MTB > # for instructional purposes to see the utility of
MTB > # regression and BRIEF as a command.
MTB > #
MTB > BRIEF output level 3
MTB > REGRESS C2 on 1 predictor in C1

The regression equation is
Grade 11 = 9.58 + 0.479 Grade 10

Predictor       Coef      Stdev    t-ratio       p
Constant       9.582      5.624       1.70   0.127
Grade 10      0.4786     0.4119       1.16   0.279

s = 4.542       R-sq = 14.4%     R-sq(adj) = 3.7%

Analysis of Variance

SOURCE        DF          SS          MS        F       p
Regression     1       27.86       27.86     1.35   0.279
Error          8      165.04       20.63
Total          9      192.90

Obs.Grade 10  Grade 11      Fit  Stdev.Fit  Residual  St.Resid
   1     10.0     13.00    14.37       1.95     -1.37     -0.33
   2      9.0      9.00    13.89       2.25     -4.89     -1.24
   3     14.0     17.00    16.28       1.47      0.72      0.17
   4     15.0     21.00    16.76       1.62      4.24      1.00
   5      8.0     17.00    13.41       2.58      3.59      0.96
   6     12.0     15.00    15.33       1.52     -0.33     -0.08
   7     14.0      9.00    16.28       1.47     -7.28     -1.70
   8     17.0     16.00    17.72       2.12     -1.72     -0.43
   9     20.0     19.00    19.15       3.15     -0.15     -0.05
  10     13.0     23.00    15.80       1.44      7.20      1.67


MTB > #
MTB > # Basically, the score for students in Grade 10 are used
MTB > # to provide a basic estimation of similar scores for
MTB > # performance in Grade 11.
MTB > #
MTB > # Is the estimation "perfect?"
MTB > #
MTB > # Of course not!
MTB > #
MTB > # But, for group decision-making, the precision may be
MTB > # quite acceptable.
MTB > #
MTB > # Become comfortable with regression and in time you will
MTB > # be able to use multiple regression methodology for even
MTB > # greater understanding of the relationships among various
```

```
MTB > # phenomena.
MTB > #
MTB > # Thomas W. MacFarland, Ed.D.
MTB > #
MTB > # December, 1989
MTB > NOOUTFILE
```

APPENDIX D

```
MTB > # Schaefer and Anderson (1989:154)
MTB > #
MTB > # Data Arrangement with SORT
MTB > #
MTB > RETRIEVE 'B:SAMPLE_0.MTW'
 WORKSHEET SAVED 12/10/1989

Worksheet retrieved from file: B:SAMPLE_0.MTW
MTB > #
MTB > INFO

COLUMN     NAME       COUNT
C1         Grade 10      10
C2         Grade 11      10
C3         Grade 12      10

CONSTANTS USED: NONE

MTB > #
MTB > PRINT C1-C3

 ROW  Grade 10  Grade 11  Grade 12

   1        10        13        21
   2         9         9        17
   3        14        17        15
   4        15        21        14
   5         8        17        25
   6        12        15        25
   7        14         9        27
   8        17        16        18
   9        20        19        21
  10        13        23        22

MTB > #
MTB > SORT the data in C1 and store in C4
MTB > NAME C4 'SORT_C1'
MTB > #
MTB > INFO

COLUMN     NAME       COUNT
C1         Grade 10      10
C2         Grade 11      10
C3         Grade 12      10
C4         SORT_C1       10

CONSTANTS USED: NONE


MTB > #
MTB > PRINT C1-C4
```

ROW	Grade 10	Grade 11	Grade 12	SORT_C1
1	10	13	21	8
2	9	9	17	9
3	14	17	15	10
4	15	21	14	12
5	8	17	25	13
6	12	15	25	14
7	14	9	27	14
8	17	16	18	15
9	20	19	21	17
10	13	23	22	20

```
MTB > #
MTB > # You may also find it helpful to use the RANK command.
MTB > #
MTB > RANK the data in C4 and store in C5
MTB > #
MTB > NAME C5 'RANK_C1'
MTB > #
MTB > INFO
```

COLUMN	NAME	COUNT
C1	Grade 10	10
C2	Grade 11	10
C3	Grade 12	10
C4	SORT_C1	10
C5	RANK_C1	10

```
CONSTANTS USED: NONE

MTB > #
MTB > PRINT C1-C5
```

ROW	Grade 10	Grade 11	Grade 12	SORT_C1	RANK_C1
1	10	13	21	8	1.0
2	9	9	17	9	2.0
3	14	17	15	10	3.0
4	15	21	14	12	4.0
5	8	17	25	13	5.0
6	12	15	25	14	6.5
7	14	9	27	14	6.5
8	17	16	18	15	8.0
9	20	19	21	17	9.0
10	13	23	22	20	10.0

```
MTB > #
MTB > # Again, practice with your own data to better learn
MTB > # the use of SORT and RANK.
MTB > #
```

```
MTB > # Thomas W. MacFarland, Ed.D.
MTB > #
MTB > # December, 1989
MTB > NOOUTFILE
```

APPENDIX E

```
MTB > # Schaefer and Anderson (1989:41)
MTB > #
MTB > # SET and READ are two Minitab commands that may
MTB > # confuse students since they serve similar purposes.
MTB > #
MTB > SET the following data into C1
MTB > END
MTB > #
MTB > PRINT C1

C1
   1    2    3    4    5

MTB > #
MTB > READ the following data into C2
      5 ROWS READ
MTB > END
MTB > #
MTB > PRINT C2

C2
   5    4    3    2    1

MTB > #
MTB > PRINT C1-C2

 ROW    C1    C2

   1     1     5
   2     2     4
   3     3     3
   4     4     2
   5     5     1

MTB > #
MTB > # Practice with these commands to see when it is to your
MTB > # advantage to use SET and when it is to your advantage
MTB > # to use READ.
MTB > #
MTB > # Thomas W. MacFarland, Ed.D.
MTB > #
MTB > # December, 1989
MTB > NOOUTFILE
```

APPENDIX F

```
MTB > # Schaefer and Anderson (1989:39)
MTB > #
MTB > # WRITE is the command that can be used to save data
MTB > # into an ASCII file.  Of course, the advantage of
MTB > # this action is that you can later use a wide variety
MTB > # of software (i.e., statistical software such as SPSS,
MTB > # spreadsheets such as Lotus 1-2-3, wordprocessing
MTB > # programs such as Wordperfect) to read and/or edit the
MTB > # data.
MTB > #
MTB > # To be brief, WRITE makes it possible for you to use
MTB > # Minitab in an integrated manner with other software.
MTB > #
MTB > RETRIEVE 'B:SAMPLE_0.MTW'
 WORKSHEET SAVED 12/10/1989

Worksheet retrieved from file: B:SAMPLE_0.MTW
MTB > #
MTB > INFO

COLUMN     NAME       COUNT
C1         Grade 10      10
C2         Grade 11      10
C3         Grade 12      10

CONSTANTS USED: NONE

MTB > #
MTB > PRINT C1-C3

 ROW  Grade 10  Grade 11  Grade 12

   1        10        13        21
   2         9         9        17
   3        14        17        15
   4        15        21        14
   5         8        17        25
   6        12        15        25
   7        14         9        27
   8        17        16        18
   9        20        19        21
  10        13        23        22


MTB > #
MTB > WRITE 'B:SAMPLE_0.DAT' from the data in C1-C3
MTB > #
MTB > # And, use RETRIEVE to see if the data were indeed saved
MTB > # into a new file on the B: drive.
MTB > #
MTB > RETRIEVE 'B:SAMPLE_0.DAT'
* ERROR * File is not a saved Minitab worksheet
```

```
MTB > # Notice that there is trouble with RETRIEVE in MINITAB
MTB > # for the data file.  But, be assured that the file is
MTB > # indeed in ASCII format and that it can be used for
MTB > # reading and/or editing with software that can read/edit
MTB > # ASCII text.
MTB > #
MTB > # Thomas W. MacFarland, Ed.D.
MTB > #
MTB > # December, 1989
MTB > NOOUTFILE
```