

# A Snapshot of Selected Dataplot Commands

10/92

## 1. Dataplot Basics

### 1.1 System Operations

DP EXIT or STOP or HALT or QUIT or BYE	Execute Dataplot Exit from Dataplot
DIMENSION 50 VARIABLES FEEDBACK OFF ECHO ON	Redimension internal Dataplot worksheet to 50 variables (do at start of run) Suppress feedback from all support commands (e.g., SUBSET) Upon execution, echo all command lines back to screen
LIST (or L) R 2 SAVE 12 6 TO 3 1 / / PRINTER or / LP or / LPT1 / / OUT.	List last 20 command lines entered Re-execute the 2-nd previous command Save command lines 12, 6, 5, 4, 3, and 1 for future re-execution Repeat the last set of command lines saved (& display output on screen) Repeat last set of comm. lines saved & divert output from screen to laser printer (Note--printer should here be in non-postscript DOS text mode) Repeat last set of comm. lines saved & divert output from screen to file OUT.
DEFINE ER ESC FF ER	Define command ER to be escape formfeed Execute command ER (which would erase screen & leave in text mode on PC)
CALL PARETO.DP CALL <user-provided file name>	Execute the Dataplot macro residing in file PARETO.DP Execute the user-written Dataplot macro residing in <user-provided file name>
SUBSET/EXCEPT/FOR e.g., PLOT Y X SUBSET DAY 2 ANOVA Y X1 X2 X3 SUBSET MONTH 7 TO 9  LINEAR FIT Y X EXCEPT Y > 90 NORMAL PROBABILITY PLOT Y FOR I = 1 1 20	Can append to any graphics & analysis commands to limit scope of execution of a plot or of an analysis Plot Y versus X but only for DAY = 2 Do ANOVA of Y on X1, X2, and X3 but only for values of MONTH variable from 7 to 9 Do linear regression of Y on X but only for Y > 90 Generate normal probability plot of first 20 elements of Y
RESET RESET VARIABLES RESET PARAMETERS RESET FUNCTIONS RESET PLOT RESET IO RESET SUPPORT	Reset all of Dataplot; in effect, exit and reexecute Dataplot Reset (= delete) all internal variables (= vectors) Reset (= delete) all internal parameters (= scalars) Reset (= delete) all internal functions (= character strings) Reset (= blank out) all plot titles, labels, and legends Reset settings for Dataplot's I/O commands Reset settings for all of Dataplot's Support commands
HELP	Display general Dataplot information & the command categories
HELP <command category> HELP GRAPHICS HELP ANALYSIS	Display information about the Dataplot <category command> category Display information about Dataplot Graphics Commands Display information about Dataplot Analysis Commands
HELP <command name> HELP PLOT HELP FIT HELP LET HELP TITLE HELP GRID HELP TEXT HELP BOX PLOT	Display information about the Dataplot <command name> command Display information about the Dataplot PLOT command Display information about the Dataplot FIT command Display information about the Dataplot LET command Display information about the Dataplot TITLE command Display information about the Dataplot GRID command Display information about the Dataplot TEXT command Display information about the Dataplot BOX PLOT command
HELP LET SUBCOMMANDS HELP FUNCTIONS HELP MATH FUNCTIONS HELP CHARACTER TYPES HELP LINES TYPES HELP TEXT SUBCOMMANDS	Display information about subcommands under the LET command Display information about all off Dataplot's internal library functions Display information about only Dataplot's internal mathematics functions Display information about allowable plot character types Display information about allowable plot line types Display information about subcommands under the TEXT command

## 1. Dataplot Basics (Continued)

### 1.2 Files & I/O

DOS DIR *.DAT	Execute the DOS DIR *.BAT command while still in Dataplot
SKIP 25	Skip the first 25 header lines of a file on subsequent READs
READ BOXSPRIN.DAT Y X1 X2 X3	Read data from file BOXSPRIN.DAT into internal variables Y, X1, X2, & 3
READ BOXSPRIN.DAT ACC OVEN CARB QUENCH	Read data from file BOXSPRIN.DAT into int. var. ACC, OVEN, CARB, & QUENCH
WRITE Y X1 X2 X3	Write variables Y, X1, X2, and X3 to screen
WRITE OUT.DAT Y X1 X2 X3	Write variables Y, X1, X2, and X3 out to the user file OUT.DAT
LIST (or L)	Display the last 20 command lines entered onto the screen
LIST BOXSPRIN.DAT	Display the contents of file BOXSPRIN.DAT onto the screen
LIST BOXSPRIN.DAT FOR I = 1 1 20	Display the first 20 lines of file BOXSPRIN.DAT onto the screen
DOS PRINT BOXSPRIN.DAT	(DOS only) Temporarily exit to DOS & send file BOXSPRIN.DAT to laser printer
SYSTEM PRINT BOXSPRIN.DAT	(In general) Temporarily exit to System & send file BOXSPRIN.DAT to laser prin.
SET READ FORMAT 4F8.0	Set format for future READs to be (Fortran-like) 4F8.0 (default = free-format)
SET WRITE DECIMALS 3	Set format for future WRITES to be 3 decimal places
SET WRITE FORMAT 4F10.2	Set format for future WRITES to be (Fortran-like) 4F10.2
CAPTURE OUT.	Start diverting all screen text output into the file OUT.
LINEAR FIT Y X	Do a linear fit of Y versus X (FIT output diverted to OUT.)
END OF CAPTURE	Stop diverting all screen text output into the file OUT.
DOS PRINT OUT.	(DOS only) Temporarily exit to DOS & send file OUT. to laser printer (Note--Laser printer must be in DOS-text mode)

## 1. Dataplot Basics (Continued)

## 1.3 Data Creation/Manipulation

LET TARGET = 20	Create the parameter (= scalar) TARGET and assign to it the value 20
LET Y = DATA 67 79 61 75 59 90 52 87	Create variable (= vector) Y with 8 elements: 67, 79, 61, ..., 87
LET X = SEQUENCE 1 1 6	Create variable X with first element = 1, increment = 1, & last element = 6, that is, X will have the 6 elements: 1 2 3 4 5 6
LET X = SEQUENCE 1 3 1 6	Create variable X with 18 elements: 1 1 1 2 2 2 3 3 3 4 4 4 5 5 6 6 6
LET X1 = PATTERN 1 2 FOR I = 1 1 8	Create variable X1 with 8 elements: 1 2 1 2 1 2 1 2
LET Y2 = Y**2	Create variable Y2 as the squared elements of Y
LET Y3 = LOG(Y)	Create variable Y3 as the natural logarithm of the elements of Y
LET Y3 = SQRT(Y)	Create variable Y3 as the square root of the elements of Y
LET DUMMY7 = IND(MONTH,7)	Create variable DUMMY7 as 1 whenever MONTH = 7, and as 0 elsewhere (thus IND(..) is an indicator function)
LET Y2 = MSD(Y)	Create variable Y2 as the most significant digit of Y
LET Y = NORMAL RANDOM NUMBERS FOR I = 1 1 8	Create variable Y with 8 random numbers from normal N(0,1) distribution
LET Y = UNIFORM RANDOM NUMBERS FOR I = 1 1 10	Create variable Y with 10 random numbers from uniform[0,1] distribution
LET GAMMA = 2.3	Create the parameter (= scalar) GAMMA and assign to it the value 2.3
LET Y = WEIBULL RANDOM NUMBERS FOR I = 1 1 20	Create variable Y with 20 rand. numb. from Weib. dist. with shape param. 2.3
LET X = RANDOM PERMUTATION FOR I = 1 1 16	Create variable X with a random permutation of 1 to 16
LET Y2 = CODE Y	Create variable Y2 as a coded version of Y, as follows: if Y = smallest, then Y2 = 1; if Y = next-smallest, then Y2 = 2, etc.
LET Y2 = CODE2 Y	Create variable Y2 as a coded version of Y, as follows: if Y <= median value of Y, then Y2 = 1; if Y > median value of Y, then Y2 = 2
LET Y2 = CODE4 Y	Create variable Y2 as a coded version of Y, as follows: if Y in first/second/third/fourth quartile of Y, then Y2 = 1/2/3/4
LET Y2 = SORT Y	Create variable Y2 as the sorted (smallest to largest) version of Y
LET Y2 = SORTC Y X1 X2 X3	Create variable Y2 as the sorted (smallest to largest) version of Y and carry along the corresponding elements in X1, X2, and X3
LET Y1 = Y; RETAIN Y1 SUBSET DAY 1	Copy Y to Y1; then retain (= keep, and pack to top of vector) only those elements in Y for which the corresponding elements of the variable DAY are equal to 1
LET Y1 = Y; EXTEND Y1 Y2	Copy Y to Y1; then extend Y1 by Y2 (= attach Y2 to the end of Y1)
LET Y2 = CUMULATIVE SUM Y	Create a variable Y2 = cumulative sum of elements of Y (thus Y2(1)=Y(1), Y2(2)=Y(1)+Y(2), Y2(3)=Y(1)+Y(2)+Y(3), etc.)
LET Y2 = DIFFERENCE Y	Create a variable Y2 = first difference of elements in the variable Y (thus Y2(1)=Y(2)-Y(1), Y2(2)=Y(3)-Y(2), Y2(3)=Y(4)-Y(3), etc.)
DELETE X Y Z	Delete variables X, Y and Z
DELETE X Y Z SUBSET Z = 2	Delete all elements in X, Y, and Z for which Z = 2 (and pack all remaining elements up to topmost positions)
DELETE X(1) Y(23) Z(1000)	Delete element 1 of X, element 23 of Y, and element 1000 of Z (and pack all remaining elements up to topmost positions)

## 2. Graphics

### 2.1 Plot Data

PLOT Y	Plot variable Y (vertically) versus dummy index 1, 2, 3, ... (horizontally) (Use current settings of title, label, legend, axis limits, plot characters, plot lines, plot spikes, plot bars, etc.)
PLOT Y X or PLOT Y VERSUS X or PLOT Y VS X	Plot variable Y (vertically) versus variable X (horizontally)
PLOT Y X TAG	Generate multi-trace plot of Y (vertically) versus X (horizontally) where distinct values of TAG variable define distinct traces
PLOT Y1 Y2 Y3 Y4 VERSUS X	Generate multi-trace plot of variables Y1, Y2, Y3, and Y4 (vertically) versus variable X (horizontally)
PLOT Y PRED VERSUS X	Generate 2-trace plot of Y and post-fit predicted values in PRED (vertically) versus variable X (horizontally)
PLOT Y VERSUS X AND PLOT PRED VERSUS X	Generate 2-trace plot of Y and post-fit predicted values in PRED (vertically) versus variable X (horizontally) <alternate method>
3D-PLOT Y X1 X2	Generate a 3-dimensional trace of Y versus X1 and X2
3D-PLOT Y X1 X2 X1 AND 3D-PLOT Y X1 X2 X2	Generate a 3-d trace of Y versus X1 & X2; cross-hatch at each X1 value Generate a 3-d trace of Y versus X1 & X2; cross-hatch at each X2 value (the net result will be a 3-d surface with cross-hatching in both direction)
LET X1 = SEQUENCE -5 1 5 FOR I = 1 1 121 LET X2 = SEQUENCE -5 11 1 5 LET Y = X1**2+X2**2 LET Y0 = DATA 10 20 30 40 CONTOUR PLOT Y X1 X2 Y0	Create variable X1 with elements -5, -4, -3, ..., 4, 5 repeated 11 times Create variable X2 with 11 -5's, 11 -4's, 11 -3's, ..., 11 4's, 11 5's Create variable Y = X1 squared + X2 squared Create variable Y0 with 4 elements: 10, 20, 30, and 40 Generate a contour plot of Y vs. X1 and X2 with contour lines at Y0

### 2.2 Plot Functions

PLOT SIN(X**2)*EXP(-X) FOR X = 0 .1 10	Generate plot of function evaluated at X = 0, .1, .2, .3, ..., 10.0
3DPLOT EXP(-X**2-Y**2) FOR X = -2 .2 2 FOR Y = -2 .2 2	Generate 3-D plot of function evaluated at X = -2.0, -1.8, -1.6, ... 1.8, 2.0 and Y = -2.0, -1.8, -1.6, ..., 1.8, 2.0

### 2.3 Character/Line/Spike/Bar Plots

STATUS	Display current status of worksheet dimensions, plot characters/lines/spikes/bars and existing internal Dataplot variables, parameters, & functions
CHARACTERS X BLANK CIRCLE	Set plot character types (for future plots) as follows: trace 1 = X; trace 2 = BLANK; trace 3 = CIRCLE
LINES SOLID DOT DASH	Set plot line types: trace 1 = SOLID; trace 2 = DOT; trace 3 = DASH
SPIKE ON ON OFF	Set plot spikes on/off: trace 1 = ON; trace 2 = ON; trace 3 = OFF
BAR ON OFF ON	Set plot bars on/off: trace 1 = ON; trace 2 = OFF; trace 3 = ON
BAR FILL ON OFF ON	Set plot bar fills on/off: trace 1 = ON; trace 2 = OFF; trace 3 = ON
BAR WIDTH .5 .5 .5	Set plot bar widths: trace 1 = .5; trace 2 = .5; trace 3 = .5
BAR DIMENSION 2 3 3	Set plot bar dimension: trace 1 = 2; trace 2 = 3; trace 3 = 3
BAR FILL ONTS ONTS OFF	Set 3-d bar fill patterns: trace 1 = ONTS; trace 2 = ONTS; trace 3 = OFF Note--ONTS means fill is ON for Top & Side of 3-d bars

## 2. Graphics (Continued)

### 2.4 Annotating Plots

TITLE DEFECTIVE SPRINGS ANALYSIS  
 Y1LABEL PERCENT DEFECTIVE  
 X1LABEL STEEL TEMPERATURE  
 LET STRING S1 = JANUARY; X2LABEL DATE = ^S1

Y1LABEL AUTOMATIC

X1LABEL AUTOMATIC

X3LABEL AUTOMATIC

Set title to DEFECTIVE SPRINGS ANALYSIS  
 Set left vertical axis label to PERCENT DEFECTIVE  
 Set first horizontal axis label to STEEL TEMPERATURE  
 Define string S1 to be JANUARY; then set second horizontal axis label to MONTH = <contents of S1 (namely, JANUARY)>  
 Set left vertical axis label so that it will automatically display the contents of the first argument of the PLOT command (e.g., PLOT PRESSURE TEMPERATURE will automatically yield PRESSURE as the left vertical axis label)  
 Set first horizontal axis label so that it will automatically display the contents of the second argument of the PLOT command (e.g., PLOT PRESSURE TEMPERATURE will automatically yield TEMPERATURE as the first horizontal axis label)  
 Set third horizontal axis label so that it will automatically display the entire command line which generated the plot (e.g., NORMAL PROBABILITY PLOT TEMPERATURE will automatically yield NORMAL PROBABILITY PLOT TEMPERATURE as the third horizontal axis label)

### 2.5 Modifying Plots

XLIMITS 0 3  
 YLIMITS 50 90  
 YLIMITS

LEGEND 1 LABORATORY 3  
 LEGEND 1 COORDINATES 20 80

GRID ON

XLOG ON  
 YLOG ON  
 LOGLOG ON  
 LOGLOG OFF

TIC OFFSET UNITS SCREEN  
 TIC OFFSET 5 5

Set (for future plots) the horizontal axis limits to 0 and 3  
 Set vertical axis plot limits to 50 and 90  
 Set vertical axis plot limits back to default (= neat and float with the dat)

Define legend 1 to be LABORATORY 3  
 Define plot coordinates for legend 1 to be 20% over and 80% up page

Set grid lines on plots to be automatically ON

Set log scale for horizontal axis to be ON  
 Set log scale for vertical axis to be ON  
 Set log scale for both axes to be ON  
 Set log scale for both axes to be OFF (& therefore revert to linear scale)

Set corner tic units to screen (0 to 100) (as opposed to data)  
 Set offset for first and last tics to be 5% from corner

### 2.6 Multiple Plots per Page

MULTIPLY 2 2  
 PLOT Y X1; PLOT Y X2; PLOT Y X3; PLOT Y X4  
 MULTIPLY OFF

TITLE HW 5 3  
 LABEL HW 4 2  
 TIC LABEL HW 4 2

Have next 2 x 2 = 4 plots automatically appear on the same page  
 Generate 4 separate plots  
 Revert back to 1 plot per page

Set height/width of plot title to be 5%/3% (of total screen height)  
 Set height & width of all plot labels to be 4% and 2%  
 Set height & width of tic labels on plots to be 4% and 2%

**2. Graphics (Continued)****2.7 Word Charts****ERASE**

Erase the screen (and remain in graphics mode)

(as opposed to ER which would erase screen but go to text mode)

**MOVE 50 50**

Move 50% across the screen &amp; 50% up the screen (therefore, go to center of s)

**JUSTIFICATION CENTER**

Set justification for future text to be center-justified

**FONT TRIPLEX**

Set font for future text to be triplex

**HW 10 7**

Set height &amp; width of future text to be 10% and 7% (of screen height &amp; width)

**TEXT ABC**

Write out the text string ABC

**BOX 40 40 60 60**

Draw a box with one corner at (40%,40%) and other corner at (60%,60%)

**CIRCLE 40 40 60 60**

Draw a circle with one circumference point at (40%,40%) and opposing point a)

**TEXT LC()ESUP()PI()I**

Write out the text string (lower case) e with superscript Greek pi and i

**2.8 Diagrams****LINE 20 20 80 80**

Draw a line segment from (20%,20%) to (80%,80%)

**ARROW 20 50 60 50**

Draw an arrow with tail at (20%,50%) and head at (60%,50%)

**HW 3 1**

Set height and width to 3% and 1% (of total screen height and width)

**AMPLIFIER 30 50 70 50**

Draw an amplifier with mid-side at (30%,50%) and with tip at (70%,50%)

**2.9 Capturing Graphics****PP**Send the current contents of the screen to a (Postscript) laser printer  
(this is an important and heavily used command)**DEVICE 2 POSTSCRIPT**

Activate a secondary output device (a file) and specify format to be postscript

**PLOT SIN(X) FOR X = 0 .1 6**

Plot the sin function—it will appear on screen and also to secondary device

**EXIT**

Exit from Dataplot

**(from DOS) PRINT DPPL1F.DAT**

Send the file DPPL1F.DAT to the postscript laser printer

## 3. Mathematics

LET Y = PRIME NUMBERS FOR I = 1 1 100

Create a variable Y consisting of the first 100 primes

LET Y2 = LOG(Y)

Create Y2 equal to the natural log of Y  
(if Y is a parameter (= scalar), then Y2 will be a parameter (= scalar));  
if Y is a variable (= vector), then Y2 will be a variable (= vector))

LET FUNCTION F = SIN(X\*\*2)\*EXP(-A\*X)

Create the function (= character string) F containing the following  
19 characters: SIN(X\*\*2)\*EXP(-A\*X)  
(F may be used directly in future operations, such as:  
transformations: LET A = 1; LET Y = F  
plotting: PLOT F for X = 0 .1 10  
fitting: FIT Y = F  
root-finding: LET R = ROOTS F WRT X FOR X = 0 TO 10  
analytic differentiation: LET FUNCTION F2 = DERIVATIVE F WRT X

LINEAR FIT Y X  
PLOT Y PRED VERSUS X  
PLOT RES X

Perform least squares linear fit of Y on X (pred. val. => PRED, residuals => RES)  
Generate a plot with 2 traces: Y versus X and PRED versus X  
Generate a plot of residuals versus X (ideal: structureless)

QUARTIC FIT Y X  
PLOT Y PRED VERSUS X  
PLOT RES X

Perform least squares quartic fit of Y on X (pred. val. => PRED, res. => RES)  
Generate a plot with 2 traces: Y versus X and PRED versus X  
Generate a plot of residuals versus X (ideal: structureless)

FIT Y X1 X2 X3  
PLOT Y PRED VERSUS X1  
PLOT Y PRED VERSUS X2  
PLOT Y PRED VERSUS X3

Perform least sq. fit of Y on X1, X2, and X3 (pred. val. => PRED, res. => RES)  
Generate a plot with 2 traces: Y versus X1 and PRED versus X1  
Generate a plot with 2 traces: Y versus X2 and PRED versus X2  
Generate a plot with 2 traces: Y versus X3 and PRED versus X3

FIT Y = EXP(-ALPHA\*X)/(A+B\*X)  
PLOT Y PRED VERSUS X  
PLOT RES X

Perform least squares non-linear fit of Y on X (pred. val. => PRED, res. => RES)  
Generate a plot with 2 traces: Y versus X and PRED versus X  
Generate a plot of residuals versus X (ideal: structureless)

FILTER WIDTH 7  
SMOOTH Y  
LET N = NUMBER Y  
LET X = SEQUENCE 1 1 N  
PLOT Y PRED VERSUS X  
PLOT RES X

Set width of smoothing window to be 7 observations (default = 3 observations)  
Perform (moving average) smooth of Y (smoothed => PRED, residuals => RES)  
Determine number of elements in the variable Y; place answer in parameter N  
Create the variable X with the sequence 1, 2, 3, ..., N  
Generate a plot with 2 traces: Y versus X and PRED versus X  
Generate a plot of residuals (= high-frequency component) versus X

FILTER WIDTH 11  
CUBIC SMOOTH Y  
LET N = NUMBER Y  
LET X = SEQUENCE 1 1 N  
PLOT Y PRED VERSUS X  
PLOT RES X

Set width of smoothing window to be 11 observations (default = 3 observations)  
Perform (least squares cubic) smooth of Y (smoothed => PRED, res. => RES)  
Determine number of elements in the variable Y; place answer in parameter N  
Create the variable X with the sequence 1, 2, 3, ..., N  
Generate a plot with 2 traces: Y versus X and PRED versus X  
Generate a plot of residuals (= high-frequency component) versus X

LOWESS PROPORTION 10  
LOWESS SMOOTH Y X  
PLOT Y PRED VERSUS X  
PLOT RES X

Set width of smoothing window to be 10% of total data width (default = 5%)  
Perform (LOWESS) smooth of Y on X (smoothed => PRED, residuals => RES)  
Generate a plot with 2 traces: Y versus X and PRED versus X  
Generate a plot of residuals (= high-frequency component) versus X

LET A = INTEGRAL Y X

Compute the (trapezoid-rule) integral of Y versus X, place result in parameA

LET Y2 = INTERPOLATE Y X X2  
PLOT Y VERSUS X Y2 VERSUS X2

Perform cubic-spline interpolation of Y on X (evaluate at X2, resultant into Y2)  
Generate a plot with 2 traces: Y versus X and Y2 versus X2

LET Y2 X2 = FFT Y X

Perform a fast Fourier transform of the complex data in Y (real) & X (imag.)  
the real and imaginary output are placed in Y2 and X2

LET Y2 X2 = INVERSE FFT Y X

Perform inv. fast Fourier transform of the complex data in Y (real) and X (imag.)  
the real and imaginary output are placed in Y2 and X2

## 4. Probability

LET P = NORCDF(2)	Create parameter P = normal N(0,1) cum. dist. function evaluated at x = 2
LET P = TCDF(2,8)	Create parameter P = t(nu=8) cum. dist. function evaluated at x = 2
LET P = CHSCDF(2,8)	Create parameter P = chi-squared(nu=8) cum. dist. function eval. at x = 2
LET P = FCDF(2,8,11)	Create parameter P = F(nu1=8,nu2=11) cum. dist. function eval. at x = 2
LET P = WEICDF(2,8)	Create parameter P = Weibull(shape=8) cum. dist. function eval. at x = 2
LET P = WALCDF(2,8)	Create parameter P = Wald(shape=8) cum. dist. function eval. at x = 2
LET P = FLCDF(2,8)	Create parameter P = Fatigue Life(shape=8) cum. dist. func. eval. at x = 2
LET P = IGCDF(2,8)	Create parameter P = Inverse Gaussian(shape=8) cum. dist. func. eval. at x = 2
LET P = RIGCDF(2,8)	Create parameter P = Recip. Inv. Gaus.(shape=8) cum. dist. func. at x = 2
LET X = NORPPF(.975)	Create parameter P = normal N(0,1) percent point function evaluated at p = .975
LET X = TPPF(.975,8)	Create parameter P = t(nu=8) percent point function eval. at p = .975
LET X = CHSPPF(.975,8)	Create parameter P = chi-squared(nu=8) percent point function eval. at p = .975
LET X = FPPF(.975,8,11)	Create parameter P = F(nu1=8,nu2=11) percent point function eval. at p = .975
LET P = WEIPPF(2,8)	Create parameter P = Weibull(shape=8) percent point function eval. at p = .975
LET P = WALPPF(2,8)	Create parameter P = Wald(shape=8) percent point function eval. at p = .975
LET P = FLPPF(2,8)	Create parameter P = Fatigue Life(shape=8) percent point func. eval. at p = .975
LET P = IGPPF(2,8)	Create parameter P = Inv. Gaus.(shape=8) percent point func. eval. at p = .975
LET P = RIGCDF(2,8)	Create parameter P = Recip. Inv. Gaus.(shape=8) percent point func. eval. at p = .975
PLOT NORPDF(X) FOR X = -3 .1 3	Plot the normal N(0,1) density function eval. at x = -3, at increments ,3
PLOT NORPDF((X-100)/10) FOR X = 70 1 130	Plot the normal N(100,10) density function evaluated at x = 70 (1) 130
PLOT WEIPDF(X,8) FOR X = .1 .1 30	Plot the Weibull (shape=8) density function for x = .1 (.1) 30
PLOT WEIPDF((X-100)/10,8) FOR X = 101 1 200	Plot the Weibull (min=100,scale=10,shape=8) dens. func. for x = 101 (1) 200
PLOT TPDF(P,3) FOR X = -10 .1 10	Plot the t(nu=3) distribution dens. func. for x = -10 (.1) 10
PLOT TPDF(P,1) FOR X = -10 .1 10 AND	Generate a plot with 3 traces: the t(nu=1) prob density function, the t(nu=2) probability density function, and the t(nu=3) probability density function
PLOT TPDF(P,2) FOR X = -10 .1 10 AND	
PLOT TPDF(P,3) FOR X = -10 .1 10	
PLOT TPPF(P,3) FOR P = .01 .01 .99	Plot the t(nu=3) distribution percent points for p = .01 (.01) .99
PLOT TPPF(.975,NU) FOR NU = 1 1 100	Plot the 97.5 percent point of the t dist. for nu = 1 (1) 100
LET Y = UNIFORM RANDOM NUMBERS FOR I = 1 1 20	Create variable Y with 20 random numbers from uniform N[0,1] distribution
LET Y = NORMAL RANDOM NUMBERS FOR I = 1 1 20	Create variable Y with 20 random numbers from normal N(0,1) distribution
LET Y = NORMAL RANDOM NUMBERS FOR I = 1 1 20	Create variable Y with 20 random numbers from normal N(0,1) distribution
LET Y2 = 100+10*Y	Create variable Y2 with 20 random numbers from normal N(100,10) distribution
LET Y = CAUCHY RANDOM NUMBERS FOR I = 1 1 100	Create variable Y with 20 random numbers from Cauchy C(0,1) distribution
LET NU = 5	
LET Y = T RANDOM NUMBERS FOR I = 1 1 40	Create variable Y with 40 random numbers from t distribution with nu = 5
LET NU = 5	
LET Y = CHI-SQUARED RAND NUMB FOR I = 1 1 40	Create variable Y with 40 random numbers from chi-squared dist. with nu = 5
LET NU1 = 5; LET NU2 = 8	
LET Y = F RANDOM NUMBERS FOR I = 1 1 40	Create variable Y with 40 random numbers from F dist. with nu1 = 5 & nu2 = 8
LET GAMMA = 4	
LET Y = WEIBULL RANDOM NUMBERS FOR I = 1 1 50	Create variable Y with 50 random numbers from Weibull dist. with shape par. = 4
LET GAMMA = 4	
LET Y = WEIBULL RANDOM NUMBERS FOR I = 1 1 50	Create variable Y with 50 random numbers from Weibull dist. with shape par. = 4
LET Y2 = 100+10*Y	Create variable Y2 with 50 random numbers from Weib. dist. with shape par. = 4 & with minimum = 100, and with scale = 10
LET RUNSEQ = RANDOM PERMUTATION FOR I = 1 1 8	Create variable RUNSEQ with a random permutation of 1 to 8



5. Statistics	
5.1 Univariate Analysis	
4-PLOT Y	Generate 4-plot analysis (run sequence plot, lag plot, histogram, normal probability plot of the data in the variable Y)
PLOT Y	Generate a plot of Y versus the dummy index 1, 2, 3, ...
LAG PLOT Y	Generate a lag plot (with lag = 1) of the data in the variable Y vertical axis = Y(i); horizontal axis = Y(i-1)
HISTOGRAM Y	Generate a histogram of Y
STEM-AND-LEAF DIAGRAM Y	Generate a stem-and-leaf diagram of the data in the variable Y
NORMAL PROBABILITY PLOT Y	Generate a normal probability plot of Y (ideal: linear) (to determine if data follows a normal distribution) vertical axis = sorted Y(i); horizontal axis = normal N(0,1) order stat medians
UNIFORM PROBABILITY PLOT Y	Generate a uniform probability plot of Y (ideal: linear) (to determine if data follows a uniform distribution) vertical axis = sorted Y(i); horizontal axis = uniform U[0,1] order stat medians
CAUCHY PROBABILITY PLOT Y	Generate a Cauchy probability plot of Y (ideal: linear) (to determine if data follows a Cauchy distribution) vertical axis = sorted Y(i); horizontal axis = Cauchy C[0,1] order stat medians
LOGNORMAL PROBABILITY PLOT Y	Generate a lognormal probability plot of Y (ideal: linear)
HALFNORMAL PROBABILITY PLOT Y	Generate a halfnormal probability plot of Y (ideal: linear)
EXPONENTIAL PROBABILITY PLOT Y	Generate a exponential probability plot of Y (ideal: linear)
EV1 PROBABILITY PLOT Y	Generate a extreme value type 1 probability plot of Y (ideal: linear)
LET NU = 6; T PROB PLOT Y	Generate t (with tail parameter = 6) probability plot (ideal: linear) (to determine if data follows a t distribution with shape = 6) vertical axis = sorted Y(i); horizontal axis = t t(0,1,6) order stat medians
LET GAMMA = 2.5; WEIBULL PROB PLOT Y	Generate Weibull (with shape parameter = 2.5) probability plot (ideal: linear) (to determine if data follows a Weibull distribution with shape = 2.5) vertical axis = sorted Y(i); horizontal axis = Weibull W(0,1,2.5) order stat medians
PPCC PLOT Y or TUKEY PPCC PLOT Y	Generate Tukey distribution probability plot correlation coefficient plot (to determine the best-fit member of the Tukey distributional family)
T PPCC PLOT Y	Generate t distribution probability plot correlation coefficient plot (to determine the best-fit member of the t distributional family)
EV2 PPCC PLOT Y	Generate extreme value type 2 distribution prob. plot corr. coef. plot (to determine the best-fit member of the ext. value dist. family)
PARETO PPCC PLOT Y	Generate Pareto type 2 distribution prob. plot corr. coef. plot (to determine the best-fit member of the Pareto dist. family)
WEIBULL PPCC PLOT Y	Generate Weibull distribution probability plot correlation coefficient plot (to determine the best-fit member of the Weibull distributional family with common constraint: minimum = 0)
WEIBULL PLOT Y	Generate Weibull plot of the data in the variable Y
INVERSE GAUSSIAN PPCC PLOT Y	Generate Inverse Gaussian distribution prob. plot corr. coef. plot (to determine the best-fit member of the Inv. Gaus. distributional family)
FAILURE TIME PPCC PLOT Y	Generate Failure Time distribution prob. plot corr. coef. plot (to determine the best-fit member of the Fail. Time distributional family)

## 5. Statistics (Continued)

### 5.1 Univariate Analysis (Continued)

#### BOX-COX NORMALITY PLOT Y

Generate Box-Cox normality plot (to determine best transformation to normal)  
vertical axis = normality measure; horizontal axis = power transformation in x

#### SUMMARY Y

Generate battery of location, variation, autocorrelation, & distribution statis

LET N = NUMBER Y  
LET S = SUM Y  
LET A = MEAN Y  
LET A = MEDIAN Y  
LET A = MIDMEAN Y  
LET S = STANDARD DEVIATION Y  
LET V = VARIANCE Y  
LET SDM = STANDARD DEVIATION OF THE MEAN Y  
LET A = AUTOCORRELATION Y  
LET C = CORRELATION X Y

Create parameter N = number of elements in the variable (= vector) Y  
Create parameter S = sum of all data in the variable Y  
Create parameter A = mean of all data in the variable Y  
Create parameter A = median of all data in the variable Y  
Create parameter A = midmean of all data in the variable Y  
Create parameter S = standard deviation of all data in the variable Y  
Create parameter V = variance of all data in the variable Y  
Create parameter SDM = standard deviation of the mean of all data in variable Y  
Create parameter A = autocorrelation of all data in the variable Y  
Create parameter A = correlation of all data in the variables X and Y

LET TARGET = 25  
LET LSL = 22  
LET USL = 28  
LET A = CPK Y

Create parameter TARGET (process target value) as 25  
Create parameter LSL (process lower spec limit) as 22  
Create parameter USL (process upper spec limit) as 28  
Create parameter A = Cpk (capability index) of data in variable Y

LET W = DATA 1 1 .9 .9 4 1.2 2 1.5  
LET M = WEIGHTED MEAN Y W  
LET S = WEIGHTED STANDARD DEVIATION Y W  
LET V = WEIGHTED VARIANCE Y W

Create variable W consisting of 8 numbers (used to define desired weights)  
Create parameter M = weighted mean of data in variable Y (with weights in W)  
Create parameter S = weighted st. dev. of data in variable Y (with weights in W)  
Create parameter V = weighted variance of data in variable Y (with weights in W)

#### TABULATE Y

Tabulate (= display a table of) distinct values and counts of the variable Y

#### AUTOCORRELATION PLOT Y SPECTRUM Y

Generate an autocorrelation plot of the data in the variable Y  
Generate a spectral plot of the data in the variable Y

#### DEMODULATION FREQUENCY .3 COMPLEX DEMODULATION AMPLITUDE PLOT Y COMPLEX DEMODULATION PHASE PLOT Y

Set demodulation frequency to .3 (cycles per observation)  
Generate a complex demod. amplitude plot (at demodulation frequency = .3)  
Generate a complex demod. phase plot (at demodulation frequency = .3)

#### FILTER WIDTH 7 SMOOTH Y LET N = NUMBER Y LET X = SEQUENCE 1 1 N PLOT Y PRED VERSUS X PLOT RES X

Set width of smoothing window to be 7 observations (default = 3 observations)  
Perform (moving average) smooth of Y (smoothed => PRED, residuals => RES)  
Determine number of elements in the variable Y; place answer in parameter N  
Create the variable X with the sequence 1, 2, 3, ..., N  
Generate a plot with 2 traces: Y versus X and PRED versus X  
Generate a plot of residuals (= high-frequency component) versus X

#### FILTER WIDTH 11 CUBIC SMOOTH Y LET N = NUMBER Y LET X = SEQUENCE 1 1 N PLOT Y PRED VERSUS X PLOT RES X

Set width of smoothing window to be 11 observations (default = 3 observations)  
Perform (least squares cubic) smooth of Y (smoothed => PRED, res. => RES)  
Determine number of elements in the variable Y; place answer in parameter N  
Create the variable X with the sequence 1, 2, 3, ..., N  
Generate a plot with 2 traces: Y versus X and PRED versus X  
Generate a plot of residuals (= high-frequency component) versus X

#### LOWESS PROPORTION 25 LOWESS SMOOTH Y X PLOT Y PRED VERSUS X PLOT RES X

Set width of smoothing window to be 25% of total data width (default = 5%)  
Perform (LOWESS) smooth of Y on X (smoothed => PRED, residuals => RES)  
Generate a plot with 2 traces: Y versus X and PRED versus X  
Generate a plot of residuals (= high-frequency component) versus X

## 5. Statistics (Continued)

## 5.2 Regression Analysis

PLOT Y X or PLOT Y VERSUS X or PLOT Y VS X	Plot variable Y versus variable X (to assist in selecting a model)
LET C = CORRELATION Y X	Create parameter C = product moment corr. coef. of Y and X (to assist in measuring linear relatedness of 2 variables)
LET C = RANK CORRELATION Y X	Create parameter C = Spearman's rank moment corr. coef. of Y and X (to assist in measuring relatedness of 2 variables)
LINEAR FIT Y X CHARACTERS X BLANK; LINES BLANK SOLID PLOT Y PRED VERSUS X PLOT RES X NORMAL PROBABILITY PLOT RES PRINT A0 A1 RESSD	Perform least squares linear fit of Y on X (pred. val. => PRED, res. => RES) Set plot characters for next plots to X and blank; set plot lines to blank and Generate a plot with 2 traces: Y versus X and PRED versus X Generate a plot of residuals versus X (ideal: structureless) Generate a normal probability plot of the residuals (ideal: linear) Print intercept, slope, and residuals standard deviation (ideal: near-zero)
QUARTIC FIT Y X PLOT Y PRED VERSUS X PLOT RES X	Perform least squares quartic fit of Y on X (pred. val. => PRED, res. => RES) Generate a plot with 2 traces: Y versus X and PRED versus X Generate a plot of residuals versus X (ideal: structureless)
FIT Y X1 X2 X3 PLOT Y PRED VERSUS X1 PLOT Y PRED VERSUS X2 PLOT Y PRED VERSUS X3	Perform least squares fit of Y on X1, X2, & X3 (pred. val. => PRED, res. => RES) Generate a plot with 2 traces: Y versus X1 and PRED versus X1 Generate a plot with 2 traces: Y versus X2 and PRED versus X2 Generate a plot with 2 traces: Y versus X3 and PRED versus X3
FIT Y = EXP(-ALPHA*X)/(A+B*X) PLOT Y PRED VERSUS X	Perform least squares non-linear fit of Y on X (pred. val. => PRED, res. => RES) Generate a plot with 2 traces: Y versus X and PRED versus X
WEIGHTS W FIT Y = EXP(-ALPHA*X)/(A+B*X)	Specify W as the variable containing desired weights for the upcoming fit Perf. weighted lst. sq. non-lin. fit of Y on X (pred. val. => PRED, res. => RES)
FIT Y = EXP(-ALPHA*X)/(A+B*X) LET W = BIWEIGHT RES WEIGHTS W FIT Y = EXP(-ALPHA*X)/(A+B*X)	Perf. (unweighted) lst. sq. non-lin. fit of Y on X (pred. val. => PRED, res. => RES) Create variable W = (Tukey robust) biweights based on previous unweighted fit Specify W as the variable containing desired weights for the upcoming fit Perform robust, weighted least sq. non-linear fit of Y on X (pred. values => PRED, residuals => RES)
FIT Y = A1*IND(TAG,1) + B1*IND(TAG,2) + SLOPE*X	Perform joint fit of 2 data sets with distinct intercepts (A1 and B1) but both having common slope (SLOPE). IND(.,.) is Dataplot indicator function
BOX-COX LINEARITY PLOT Y X	Generate Box-Cox linearity plot (determine best transf. of X to achieve linearity) vertical axis = linearity measure; horizontal axis = power transformation ix
LET KNOTS = DATA 10 30 80 CUBIC SPLINE FIT Y X KNOTS	Create a variable KNOTS consisting of 3 values: 10, 30, and 80 Carry out a cubic spline fit of the data in Y and X with partition points in S
LINEAR CORRELATION PLOT Y X TAG	Generate a linear correlation plot of Y on X (For each distinct value of TAG, extract the subset consisting of the corresponding values of Y and X; compute the correlation coefficient of this subset; plot this correlation coefficient versus the TAG value; repeat for all distinct values of TAG; therefore, vertical axis = subset correlation coefficient; horizontal axis = TAG)
LINEAR SLOPE PLOT Y X TAG	Generate a linear slope plot of Y on X vertical axis = slope from linear fit of subset; horizontal axis = TAG)
LINEAR INTERCEPT PLOT Y X TAG	Generate a linear intercept plot of Y on X vertical axis = intercept from linear fit of subset; horizontal axis = TAG)
LINEAR RESSD PLOT Y X TAG	Generate a linear residual standard deviation plot of Y on X vertical axis = res. s.d. from linear fit of subset; horizontal axis = TAG)

## 5. Statistics (Continued)

## 5.3 Multi-Factor Analysis

BOX PLOT Y X

Generate Box Plot of Y on X

MEAN PLOT Y X

Generate a mean plot of Y on X  
 (For each distinct value of X, compute the mean of all corresponding values of Y, and then plot the means versus each X)

MEDIAN PLOT Y X  
 SD PLOT Y X

Generate a median plot of Y on X  
 Generate a standard deviation plot of Y on X

TABULATE COUNTS Y X  
 TABULATE MEAN Y X  
 TABULATE STANDARD DEVIATION Y X  
 TABULATE RANGE Y X

Tabulate (= display a table of) number of Y values at each distinct value in X  
 Tabulate (= display a table of) mean of Y values at each distinct value in X  
 Tabulate (= display a table of) stsn. dev. of Y values at each distinct value in X  
 Tabulate (= display a table of) range of Y values at each distinct value in X

PLOT Y1 Y2 Y3 Y4 VS X

Generate multi-trace plot of variables Y1, Y2, Y3, and Y4 (vertically)  
 versus variable X (horizontally)

MULTIPLY 2 3  
 LOOP FOR K = 1 1 6  
 HISTOGRAM Y^K  
 END LOOP

Have next 2 x 3 = 6 plots automatically appear on the same page  
 Initiate a loop with dummy parameter K taking on the values 1, 2, ..., 6  
 Generate a series of 6 plots: histogram of Y1, histogram of Y2, ..., histogram6  
 Terminate the loop

MULTIPLY 2 3  
 LOOP FOR K = 1 1 6  
 PLOT Y^K VERSUS X  
 END LOOP

Have next 2 x 3 = 6 plots automatically appear on the same page  
 Initiate a loop with dummy parameter K taking on the values 1, 2, ..., 6  
 Generate a series of 6 plots: Y1 versus X, Y2 versus X, ..., Y6 versus X  
 Terminate the loop

MULTIPLY 2 3  
 LOOP FOR K = 1 1 6  
 LOOP FOR L = 1 1 6  
 PLOT Y^K VERSUS Y^L  
 END LOOP  
 END LOOP

Have next 2 x 3 = 6 plots automatically appear on the same page  
 Initiate a loop with dummy parameter K taking on the values 1, 2, ..., 6  
 Initiate a loop with dummy parameter L taking on the values 1, 2, ..., 6  
 Generate a series of 36 plots: Y1 versus X, Y2 versus X, ..., Y6 versus X  
 Terminate the loop for L  
 Terminate the loop for K

ANOVA Y X1 X2 X3 X4 X5  
 MEDIAN POLISH Y X1 X2 X3 X4 X5

Carry out a (balanced) Analysis of Variance of Y on X1, X2, X3, X4, X5  
 Carry out a (balanced) (Tukey) Median Polish of Y on X1, X2, X3, X4, X5

BLOCK PLOT Y X2 X1

Generate a block plot of Y on X2 and X1  
 vertical axis = Y; horizontal axis = X2; plot character = X1

BLOCK PLOT Y X2 X3 X4 X1

Generate a block plot of Y on X2, X3, X4 and X1  
 vertical axis = Y; horizontal axis = X2 x X3 x X4; plot character = X1

## 5. Statistics (Continued)

## 5.4 Multi-Response (Multivariate) Analysis

MULTI PLOT 2 2 PLOT Y1 PLOT Y2 PLOT Y1 Y2 MULTI PLOT OFF	Have next 2 x 2 = 4 plots automatically appear on the same page Generate the 1st plot: Y1 versus the dummy index 1, 2, 3, ... Generate the 2nd plot: Y2 versus the dummy index 1, 2, 3, ... Generate the 3rd plot: Y1 versus Y2 Revert back to 1 plot per page
BIHISTOGRAM Y1 Y2 QUANTILE-QUANTILE PLOT Y1 Y2	Generate a bihistogram of the data in Y1 and Y2 Generate a quantile-quantile plot of the data in Y1 and Y2
CROSS-TAB Y1 Y2 T TEST Y1 Y2	Tabulate (= display a table of) distinct values & counts of the variables Y1 & Y2 Carry out a t-test for the 2 variables Y1 and Y2
LET N = NUMBER Y1 LET X = SEQUENCE 1 1 N PLOT Y1 Y2 Y3 Y4 Y5 Y6 Y7 Y8 VERSUS X	Create parameter N = number of elements in the variable (= vector) Y Create variable X with elements 1, 2, 3, 4, ..., N Generate multi-trace plot of Y1, Y2, ..., Y8 versus X
MULTI PLOT 2 4 LOOP FOR K = 1 1 8 HISTOGRAM Y^K END LOOP	Have next 2 x 4 = 8 plots automatically appear on the same page Initiate a loop with dummy parameter K taking on the values 1, 2, ..., 8 Generate a series of 8 plots: histogram of Y1, histogram of Y2, ..., histogram Y8 Terminate the loop
MULTI PLOT 2 4 LOOP FOR K = 1 1 8 PLOT Y^K END LOOP	Have next 2 x 4 = 8 plots automatically appear on the same page Initiate a loop with dummy parameter K taking on the values 1, 2, ..., 8 Generate a series of 8 plots: Y1 versus i, Y2 versus i, ..., Y8 versus i Terminate the loop
STAR PLOT Y1 Y2 Y3 Y4 Y5 Y6 Y7 Y8 PROFILE PLOT Y1 Y2 Y3 Y4 Y5 Y6 Y7 Y8	Generate a star plot for the 8 variables Y1 to Y8 Generate a profile plot for the 8 variables Y1 to Y8
LET V1 = FIRST PRIN COMP Y1 Y2 Y3 Y4 Y5 Y6 Y7 Y8 LET V2 = SECOND PRIN COMP Y1 Y2 Y3 Y4 Y5 Y6 Y7 Y8 PLOT V1 V2	Create the 8-element variable V1 = the 1st prin. comp. for the 8 variables Create the 8-element variable V2 = the 2nd prin. comp. for the 8 variables Plot the 1st prin. comp. (vertically) vs. the 2nd prin. comp. (horizontally)
LET V1 = FIRST PRIN EIGEN Y1 Y2 Y3 Y4 Y5 Y6 Y7 Y8 LET V2 = SECOND PRIN EIGEN Y1 Y2 Y3 Y4 Y5 Y6 Y7 Y8	Create the 8-element variable V1 = the 1st prin. eigenvalue for the 8 variables Create the 8-element variable V2 = the 2nd prin. eigenvalue for the 8 variables

5. Statistics (Continued)	
5.5 Time Series Analysis	
4-PLOT Y	Generate 4-plot analysis (run sequence plot, lag plot, histogram, normal probability plot of the data in the variable Y)
PLOT Y	Plot the data in the variable Y (versus the dummy index 1, 2, 3, ...)
LAG PLOT Y	Generate a lag plot (with lag = 1) of the data in the variable Y vertical axis = Y(i); horizontal axis = Y(i-1)
LAG 2 PLOT Y	Generate a lag plot (with lag = 2) of the data in the variable Y vertical axis = Y(i); horizontal axis = Y(i-2)
LAG 12 PLOT Y	Generate a lag plot (with lag = 12) of the data in the variable Y vertical axis = Y(i); horizontal axis = Y(i-12)
AUTOCORRELATION PLOT Y	Generate an autocorrelation plot of the data in the variable Y vertical axis = autocorr. of Y(i) and Y(i+h); horizontal axis = lag h
SPECTRUM Y	Generate a spectral plot of the data in the variable Y vertical axis = variance component; horizontal axis = frequency (0 to .5 cyc)
LOGLOG ALLAN VARIANCE	Set both axes to be log scale for future plots Generate an Allan variance plot of the data in the variable Y vertical axis = Allan variance; horizontal axis = subset size
DEMODULATION FREQUENCY .3 COMPLEX DEMODULATION AMPLITUDE PLOT Y COMPLEX DEMODULATION PHASE PLOT Y	Set demodulation frequency to .3 (cycles per observation) Generate a complex demod. amplitude plot (at demodulation frequency = .3) Generate a complex demod. phase plot (at demodulation frequency = .3)
LET Y2 X2 = FFT Y	Perform a fast Fourier transform of the real data in Y the real and imaginary output are placed in Y2 and X2
LET Y2 X2 = FFT Y X	Perform a fast Fourier transform of the complex data in Y and X the real and imaginary output are placed in Y2 and X2
LET Y2 X2 = INVERSE FFT Y X	Perform an inverse fast Fourier transform of the complex data in Y (real) and X the real and imaginary output are placed in Y2 and X2
LET Y2 X2 = FOURIER TRANSFORM Y	Perform a (slow) Fourier transform of the real data in Y the real and imaginary output are placed in Y2 and X2
LET Y2 X2 = FOURIER TRANSFORM Y X	Perform a (slow) Fourier transform of the complex data in Y and X the real and imaginary output are placed in Y2 and X2
LET Y2 X2 = INVERSE FOURIER TRANSFORM Y X	Perform an inv. (slow) Fourier transform of complex data in Y (real) & X (imag.) the real and imaginary output are placed in Y2 and X2
FILTER WIDTH 7 SMOOTH Y LET N = NUMBER Y LET X = SEQUENCE 1 1 N PLOT Y PRED VERSUS X PLOT RES X	Set width of smoothing window to be 7 observations (default = 3 observations) Perform (moving average) smooth of Y (smoothed => PRED, residuals => RES) Determine number of elements in the variable Y; place answer in parameter N Create the variable X with the sequence 1, 2, 3, ..., N Generate a plot with 2 traces: Y versus X and PRED versus X Generate a plot of residuals (= high-frequency component) versus X
FILTER WIDTH 11 CUBIC SMOOTH Y LET N = NUMBER Y LET X = SEQUENCE 1 1 N PLOT Y PRED VERSUS X PLOT RES X	Set width of smoothing window to be 11 observations (default = 3 observations) Perform (least squares cubic) smooth of Y (smoothed => PRED, res. => RES) Determine number of elements in the variable Y; place answer in parameter N Create the variable X with the sequence 1, 2, 3, ..., N Generate a plot with 2 traces: Y versus X and PRED versus X Generate a plot of residuals (= high-frequency component) versus X
LOWESS PROPORTION 25 LOWESS SMOOTH Y X PLOT Y PRED VERSUS X PLOT RES X	Set width of smoothing window to be 25% of total data width (default = 5%) Perform (LOWESS) smooth of Y on X (smoothed => PRED, residuals => RES) Generate a plot with 2 traces: Y versus X and PRED versus X Generate a plot of residuals (= high-frequency component) versus X

## 5. Statistics (Continued)

### 5.6 Uncertainty Analysis

JACKKNIFE MEAN PLOT Y

Generate a jackknife mean plot for the data in the variable Y  
vert. axis = mean for i-th jackknife sample; hor. axis = bootstrap)

JACKKNIFE MEDIAN PLOT Y

Generate a jackknife median plot for the data in the variable Y  
vert. axis = median for i-th jackknife sample; hor. axis = bootstrap)

BOOTSTRAP MEAN PLOT Y

Generate a bootstrap mean plot for the data in the variable Y  
vert. axis = mean for i-th bootstrap sample; hor. axis = bootstrap)

BOOTSTRAP MEDIAN PLOT Y

Generate a bootstrap median plot for the data in the variable Y  
vert. axis = median for i-th bootstrap sample; hor. axis = bootstrap)

BOOTSTRAP MIDMEAN PLOT Y

Generate a bootstrap midmean plot for the data in the variable Y

BOOTSTRAP RANGE PLOT Y

Generate a bootstrap range plot for the data in the variable Y

BOOTSTRAP SD PLOT Y

Generate a bootstrap sd plot for the data in the variable Y

BOOTSTRAP LINEAR CORRELATION PLOT Y X

Generate a bootstrap linear correlation plot for Y and X

BOOTSTRAP LINEAR INTERCEPT PLOT Y X

Generate a bootstrap linear intercept plot for Y and X

BOOTSTRAP LINEAR SLOPE PLOT Y X

Generate a bootstrap linear slope plot for Y and X

BOOTSTRAP LINEAR RESSD PLOT Y X

Generate a bootstrap linear residual s.d. plot for Y and X

LET NUMBOOT = 100

Create parameter NUMBOOT and set = 100

LET N = NUMBER Y

Create parameter N = number of elements in the variable Y

LOOP FOR K = 1 1 NUMBOOT

Initiate a loop with dummy parameter K taking on the values 1, 2, ..., NUMBOOT

LET IND = BOOTSTRAP INDEX FOR I = 1 1 N

Create a variable IND = random sample with replacement of 1, 2, 3, ..., N

LET Y2 = BOOTSTRAP SAMPLE Y IND

Create a variable Y2 = bootstrap sample of Y based on current contents of IND

WEIBULL PLOT Y2

Generate a Weibull Plot of Y2 (which also computes B99 = est. 99 percent point)

LET STAT(K) = B99

Place the current value of B99 into the k-th element of the variable (vector)T

END LOOP

Terminate the loop

LET MEANSTAT = MEAN STAT

Generate the parameter MEANSTAT = mean of the B99 values in variable STAT

LET SDSTAT = STANDARD DEVIATION STAT

Generate the parameter SDSTAT = stan. dev. of the B99 values in variable STAT

X2LABEL MEAN(B99) = ^MEANSTAT

Set 2nd horiz. axis label for upcoming histogram to the computed mean B99

X3LABEL SD(B99) = ^SDSTAT

Set 3rd horiz. axis label for upcoming histogram to the computed s.d. of B99

HISTOGRAM STAT

Generate a histogram of the B99 values in the variable STAT

## 6. Design of Experiment

### 6.1 Organization

LIST DEXSUMSH.TEX  
DOS PRINT DEXSUMSH.TEX

List the Exp. Design Summary Sheet file DEXSUMSH.TEX to the screen  
Send the Exp. Design Summary Sheet file DEXSUMSH.TEX to laser printer

LIST DEXSUMS2.TEX  
DOS PRINT DEXSUMS2.TEX

List the Exp. Design Summary Sheet file DEXSUMS2.TEX to the screen  
Send the Exp. Design Summary Sheet file DEXSUMS2.TEX to laser printer

### 6.2 Construction

LIST DEXPLANS.TEX

List the Dataplot file DEXPLANS.TEX onto the screen  
DEXPLANS.TEX contains a list of all experimental plans available in Dataplot  
List (onto screen) the file DEXRES4.TEX containing instructions  
for resolution 4 designs for numbers of factors = 3, 4, 5, 6, ..., 11, 15, 2

LIST DEXRES4.TEX

SKIP 25; READ LATSQ4.DAT X1 X2 X3  
SKIP 25; READ 2TO3.DAT X1 X2 X3  
SKIP 25; READ 2TO8M4.DAT X1 X2 X3 X4 X5 X6 X7 X8  
SKIP 25; READ L8.DAT X1 X2 X3 X4 X5 X6 X7  
SKIP 25; READ PLACBURM.DAT X1 TO X11

Read the Exp. Des. 4-by-4 Latin Square design file into Dataplot  
Read the Exp. Des. 2\*\*3 full factorial design file into Dataplot  
Read the Exp. Des. 2\*\*(8-4) fractional fact. design file into Dataplot  
Read the Exp. Des. Taguchi L8 design file into Dataplot  
Read the Exp. Des. Plackett-Burman design file into Dataplot

LET X1 = PATTERN -1 +1 FOR I = 1 1 8  
LET X1 = PATTERN 1 2 FOR I = 1 1 8  
LET X2 = DATA 1 1 2 2 1 1 2 2

Create the variable X with 8 elements: -1 +1 -1 -1 +1 -1 -1 +1  
Create the variable X1 with 8 elements: 1 2 1 2 1 2 1 2  
Create the variable X with 8 elements: 1 1 2 2 1 1 2 2

LET RUNSEQ = RANDOM PERMUTATION FOR I = 1 1 8

Create a variable RUNSEQ consisting of a random permutation of 1 to 8



## 6. Design of Experiment (Continued)

## 6.3 Analysis

LIST DEXEXAMP.TEX	List the Dataplot file DEXEXAMP.TEX onto the screen
LIST BOXSPRIN.DAT SKIP 25; READ BOXSPRIN.DAT Y X1 X2 X3	DEXEXAMP.TEX contains a list of all experimental design data sets available List onto screen the contents of Dataplot file BOXSPRIN.DAT Read into Dataplot the contents of Dataplot file BOXSPRIN.DAT
LIST BOXBIKE2.DAT SKIP 25; READ BOXBIKE2.DAT Y X1 X2 X3 X4 X5 X6 X7	List onto screen the contents of Dataplot file BOXBIKE2.DAT Read into Dataplot the contents of Dataplot file BOXSPRIN.DAT
PLOT Y RUNSEQ	Plot the data in variable Y versus the variable RUNSEQ
DEX SCATTER PLOT Y X1 TO X7	Generate a Des. of Exp. Scatter Plot of Y on X1 to X7
DEX MEAN PLOT Y X1 TO X7	Generate a Des. of Exp. Mean Plot of Y on X1 to X7 (very important)
DEX SD PLOT Y X1 TO X7	Generate a Des. of Exp. Standard deviation Plot of Y on X1 to X7
DEX TAGUCHI SN0 PLOT Y X1 TO X7	Gen. a Des. of Exp. Taguchi Sig.-to-Noise ("on target") Plot of Y on X1 to X7
DEX TAGUCHI SN- PLOT Y X1 TO X7	Gen. a Des. of Exp. Taguchi Sig.-to-Noise ("small is good") Plot of Y on X1 to X7
DEX TAGUCHI SN+ PLOT Y X1 TO X7	Gen. a Des. of Exp. Taguchi Sig.-to-Noise ("large is good") Plot of Y on X1 to X7
READ BOXSPRIN.DAT Y X1 X2 X3 DEX MEAN PLOT Y X1 TO X3 LET NUMFAC = 3 LET DP = 2 LET STRING STAT = MEAN YLIMITS 50 90 CALL DEXSTAT2.DP	Read in the 2**3 full factorial data from dataplot file BOXSPIN.DAT Generate a Des. of Exp. Mean Plot of Y on X1 to X3 (very important) Create the parameter NUMFAC (# of factors) as 3 (needed by DEXSTAT2.DP) Create the parameter DP (# of decimals places) as 2 (needed by DEXSTAT2.DP) Create the string STAT (desired stat) as MEAN (needed by DEXSTAT2.DP) Set plot vertical axis limits as 50 to 90 (needed by DEXSTAT2.DP) Execute the Dataplot macro file DEXSTAT2.DP which carries out a main-effect & 2-factor graphical analysis of effects
YATES ANALYSIS Y  SKIP 0; READ DPST1F.DAT TAG COEF NORMAL PROBABILITY PLOT COEF	Carry out a Yates analysis of the data in variable Y (assumed to be in Yates) (Note--estimated effects automatically written out to file DPST1F.DAT) Read Yates analysis estimated effects in from file Generate normal probability plot of coefficients
ANOVA Y X1 X2 X3 PLOT RES RUNSEQ NORMAL PROBABILITY PLOT RES CALL DEXCUBE.DP CALL DEXSQUAR.DP	Carry out a (balanced) Analysis of Variance of Y on X1, X2, and X3 Plot the residuals from a fit versus the variable RUNSEQ Generate a normal probability plot of residuals (ideal = linear) Execute the Dataplot 2**3 full factorial menu macro DEXCUBE.DP Execute the Dataplot 2**2 full factorial menu macro DEXSQUAR.DP

7. Quality and Productivity	
7.1 General Q & P	
4-PLOT Y	Generate 4-plot analysis (run sequence plot, lag plot, histogram, normal probability plot of the data in the variable Y)
XBAR CHART Y X RANGE CHART Y X	Generate an Xbar Control Chart of the raw data in Y with tags in X Generate an Range Control Chart of the raw data in Y with tags in X
SUMMARY Y LET M = MEAN Y LET S = STANDARD DEVIATION Y LET SDM = STANDARD DEVIATION OF THE MEAN Y	Generate battery of location, variation, autocorrelation, & distribution statis Create parameter A = mean of all data in variable Y Create parameter S = standard deviation of all data in variable Y Create parameter SDM = standard deviation of the mean for all data in variable Y
CONFIDENCE LIMITS Y	Compute a table of various confidence limits for mu and sigma for the data in Y
HISTOGRAM Y NORMAL PROBABILITY PLOT Y	Generate a histogram of the data in the variable Y Generate a normal probability plot of the data in the variable Y (ideal: lin)
LET TARGET = 25 LET LSL = 22 LET USL = 28 LET A = CPK Y	Create parameter TARGET (process target value) as 25 Create parameter LSL (process lower spec limit) as 22 Create parameter USL (process upper spec limit) as 28 Create parameter A = Cpk (capability index) of data in variable Y
7.2 7 Old Tools	
CALL ISHIKAWA.DP CALL PARETO.DP HISTOGRAM Y BIHISTOGRAM Y1 Y2 PLOT Y X or PLOT Y VERSUS X or PLOT Y VS X	Execute the Dataplot Ishikawa menu macro in file ISHIKAWA.DP Execute the Dataplot Pareto Diagram menu macro in file PARETO.DP Generate a histogram of the data in the variable Y Generate a bihistogram of the data in Y1 and the data in Y2 Generate a scatter plot of variable Y versus variable X
LET TARGET = 25 LET LSL = 22 LET USL = 28 XBAR CONTROL CHART Y X	Create parameter TARGET (process target value) as 25 Create parameter LSL (process lower spec limit) as 22 Create parameter USL (process upper spec limit) as 28 Generate a xbar (= mean) control chart for the raw data in Y and X
RANGE CONTROL CHART Y X	Generate a range control chart for the raw data in Y and X

