

Data Summarization in MINITAB

We will show how to visually summarize data and compute Descriptive Statistics in MINITAB via two examples.

1. In a study of job satisfaction, a series of tests were administered to 60 subjects and the following data was obtained (higher score represents higher job satisfaction) (data file Score.xlsx)

Score					
76	86	66	91	53	79
85	82	80	84	66	66
78	69	77	70	75	72
70	62	56	77	75	69
78	85	69	75	83	58
75	69	70	71	76	53
73	84	72	72	80	71
70	82	55	84	51	68
72	101	86	93	87	65
78	99	90	77	79	78

Compute descriptive statistics and graph the dot diagram, stem-and-leaf diagram, box plot and histogram for the data.

2. The following table shows economic data for 36 firms in Japan (data file Japan.xlsx)

Short Name	Market_Cap_Yen	Market Cap US \$	Book Equity	Revenues	Net Income	PE
CENTURY21 REAL	14496	\$123.72	1924.79	2452.09	463.24	31.29
BALS CORP	43231.88	\$369.01	3239	18994	464	93.17
MAINICHI COMNET	10723.2	\$91.69	2675	6449	464	23.11
MUTUAL	5990.63	\$51.42	6915	10100	464	12.91
NISSIN SHOJI CO	9728	\$83.18	17129	70529	464	20.97
TOW CO LTD	8030.752	\$68.94	3782	10705	465	17.27
CLEX CO LTD	10105.62	\$86.41	4455	9486	466	21.69
FENWAL						
CONTROLS	6334.975	\$54.37	4357	14930	466	13.59
FUJII SANGYO	8008	\$68.62	11392	46927	466	17.18
MOLITEC STEEL	10760.17	\$92.07	10221	18923	466	23.09
TAKACHIHO						
KOHEKI	19198.13	\$164.18	12108	22318	466	41.2
GMO HOSTING	67081.95	\$571.52	1247	3038	467	143.64
MIURA PRINTING	11011.9	\$94.15	9504	22136	467	23.58
TSUKEN CORP.	9278.147	\$79.65	14182	44581	468	19.83
KING CO LTD	14615.24	\$124.94	16822	22369	469	31.16
NIPPON RESIBON	5926.8	\$50.88	5760	15012	471	12.58
AVAL DATA CORP	10725.84	\$91.76	7682.24	7775.44	471.64	22.74
SOMAR CORP	15885.06	\$135.62	14781	36540	472	33.65
MISUMI CO LTD	8296.68399	\$71.22	10796	48836	473	17.54

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NICHIWA SANGYO HARADA INDUS CO	11144.49	\$95.32	15779	42124	473	23.56
IMV CORP MARUFUJI SHEET P	11388.83	\$97.43	6376	20771	474	24.03
DAIDO SIGNAL CO KANESHITA CONSTR	8478.508	\$72.75	2006	5088	476	17.81
KAKAKU.COM INC MR MAX CORP NAGOYA ELECTRIC	16108.48	\$137.51	24738	32758	476	33.84
ZOA CORP CHUO KAGAKU CO L	6954.948	\$59.69	8214	17632	477	14.58
PALTEK CORP RIX CORP ENSHU TOYAMA BANK LTD	17605.8	\$150.57	23205	19760	477	36.91
WAO CORP OIE SANGYO CO	71655.67	\$610.72	2223.01	2138.87	478.05	149.89
	28044.59	\$239.30	28391	86133	480	58.43
	6755.84	\$57.98	15568	15646	480	14.07
	6889.5	\$59.12	1629	17589	481	14.32
	28088.1	\$239.70	30825	82965	483	58.15
	6150.098	\$52.78	8711	19355	483	12.73
	8726.4	\$74.90	4978.53	27043.88	483.76	18.04
	22391.1	\$191.39	6409	35665	484	46.26
	17417.16	\$148.64	22493	7486	484	35.99
	6733.8	\$57.71	3577	15033	484.0665	NA
	11568.75	\$98.92	9021	52180	485	23.85

- a) Graph Book_equity vs. Revenue.
- b) Graph all variables against each other.
- c) Calculate the correlation coefficient matrix.
- d) Calculate descriptive statistics for PE by the following categories:
 - Market_Cap_US\$ 50 to 100
 - 100 to 200
 - 200 to 300
 - > 300
- e) Plot the histogram of Book_Equity.
- f)) Construct a crosstabulation for PE and Market_Cap_US using the following ranges:

PE range: 10 – 50, 50 – 100, > 100

Market_Cap_US range: 50 – 100 = 1, 100 – 200 = 2, 200 – 300 = 3, > 300 = 4.

1. Descriptives and Dot Diagram, Stem-and-leaf Diagram, and Histogram for SCORE data of Example 1

Open the score.xlsx file in Excel (or copy and paste Score data in Excel), then

- (a) click on Stat/Basic Statistics/Display Descriptive Statistics (see Figure 1a), and double-click on 'C1 Score' to select the variable Score (see Figure 1b), then click OK to get the output shown in Figure 1c.

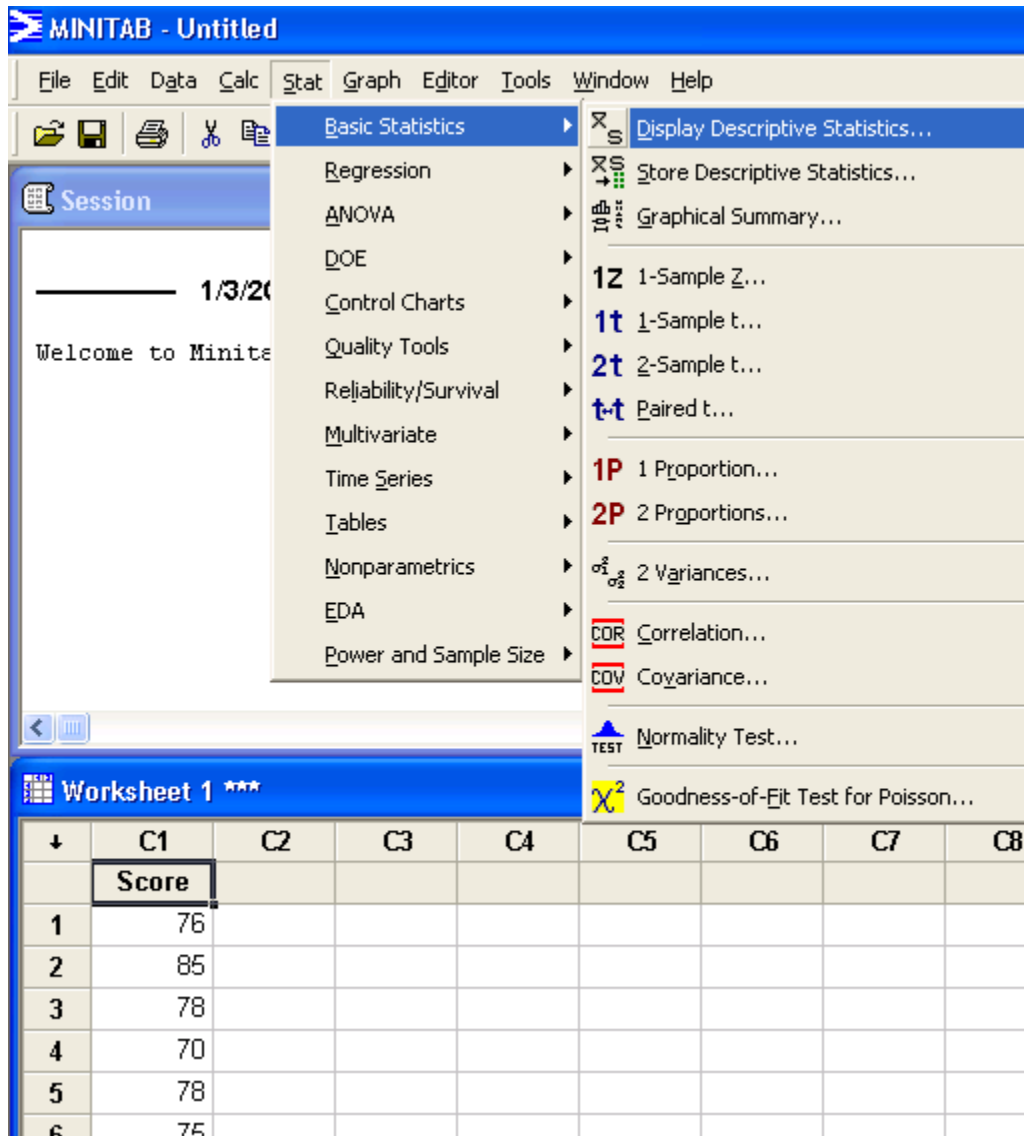


Figure 1a: Computing Descriptive Statistics in MINITAB

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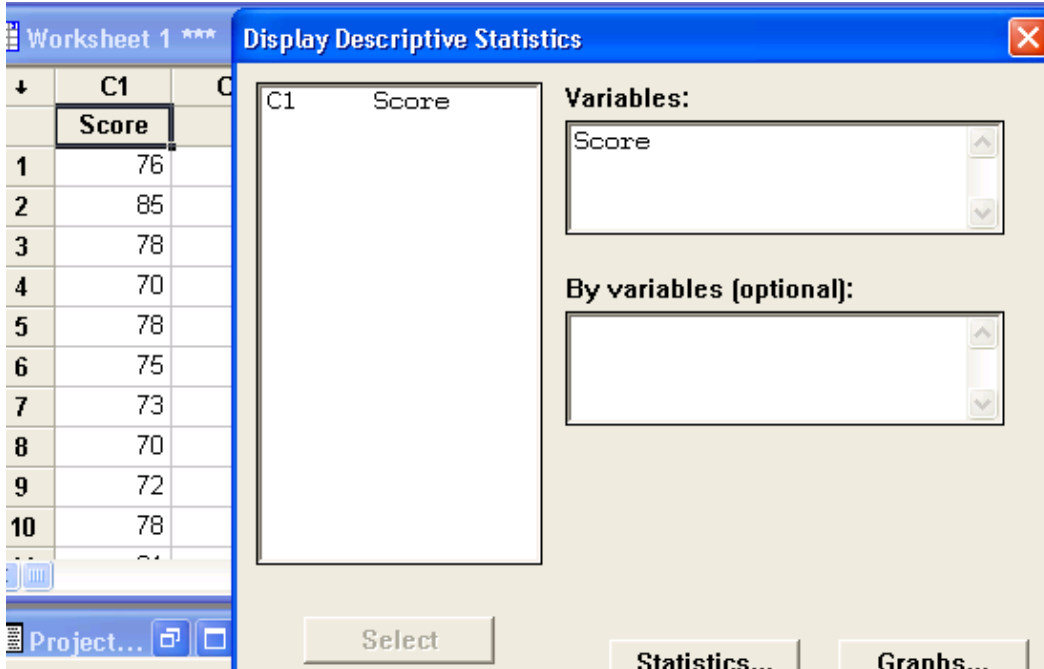


Figure 1b: Selecting Variable for Computing Descriptive Statistics in MINITAB

Descriptive Statistics: Score

Variable	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
Score	60	0	74.88	1.37	10.62	51.00	69.00	75.00	82.00	101.00

Figure 1c: MINITAB output

- (b) Click on Graph/Dotplot which will open the window shown in Figure 1d. Click on the Simple dotplot, select Score as the variable (double-click on Score), and click OK to get the dotplot of Figure 1e.

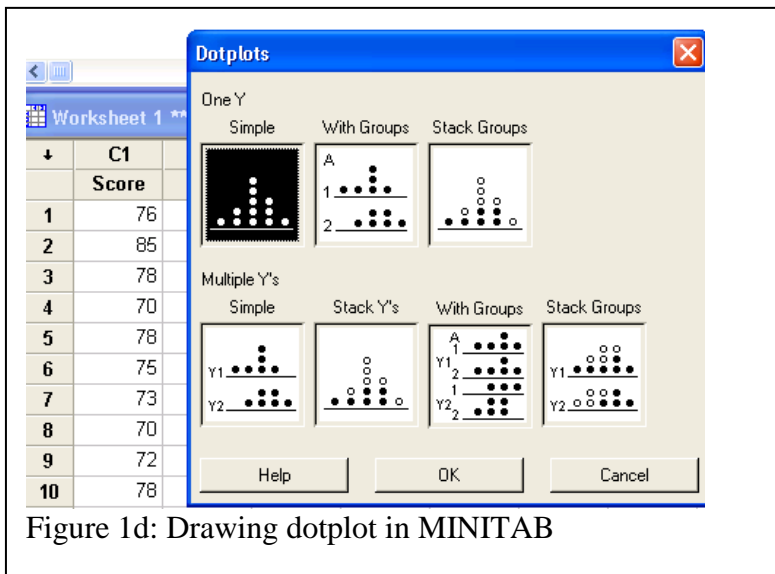


Figure 1d: Drawing dotplot in MINITAB

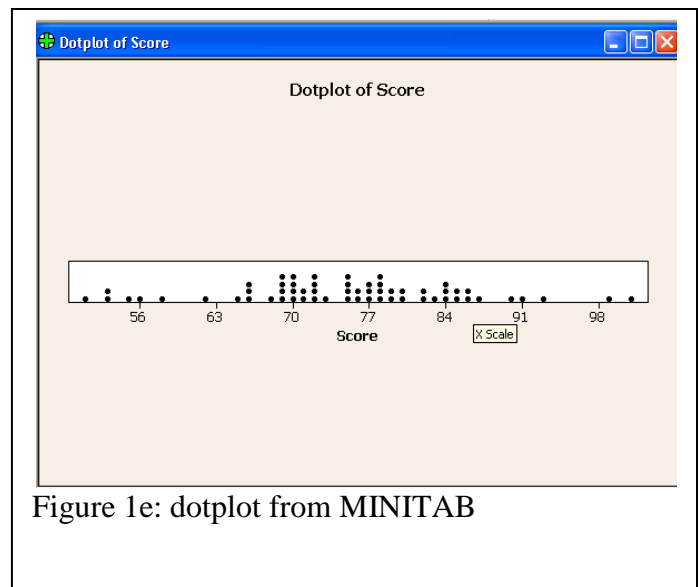


Figure 1e: dotplot from MINITAB

(c) In MINITAB, click on Graph/Stem-and-Leaf, select Score as variable, then click OK to get the Stem-and-Leaf Display shown below.

Stem-and-Leaf Display: Score

Stem-and-leaf of Score N = 60
Leaf Unit = 1.0

```

3   5   133
6   5   568
7   6   2
16  6   566689999
27  7   00001122223
(15) 7   555566777888899
18  8   00223444
10  8   55667
5   9   013
2   9   9
1   10  1
    
```

(d) Click on Graph/Histogram, select Simple Histogram, select Score as the variable, click OK to obtain the Histogram of Score shown in Figure 1f.

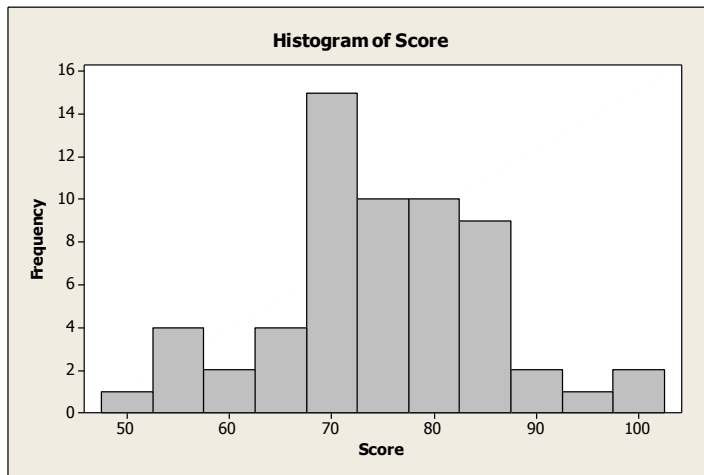


Figure 1f: Default Histogram of Score

The default histogram has 11 bins. Suppose you wanted a histogram with 8 class intervals or bins. Double-click on a histogram bar, which will open the Edit Bars window (Figure 1g), click on Binning tab, then on Number of intervals, enter 8 in the box, then click OK to get the desired histogram with 8 bins (Figure 1g).

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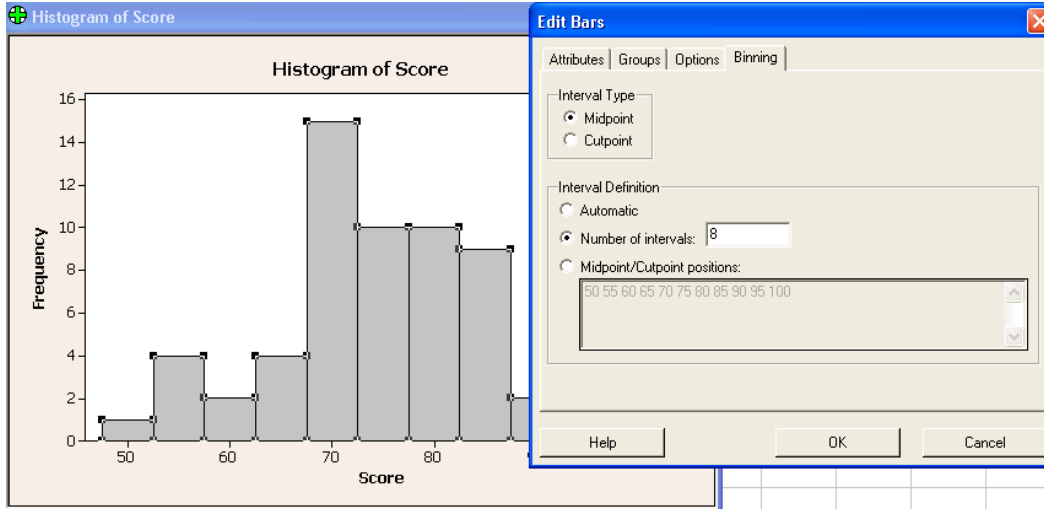


Figure 1g: Changing number of bins in the Histogram

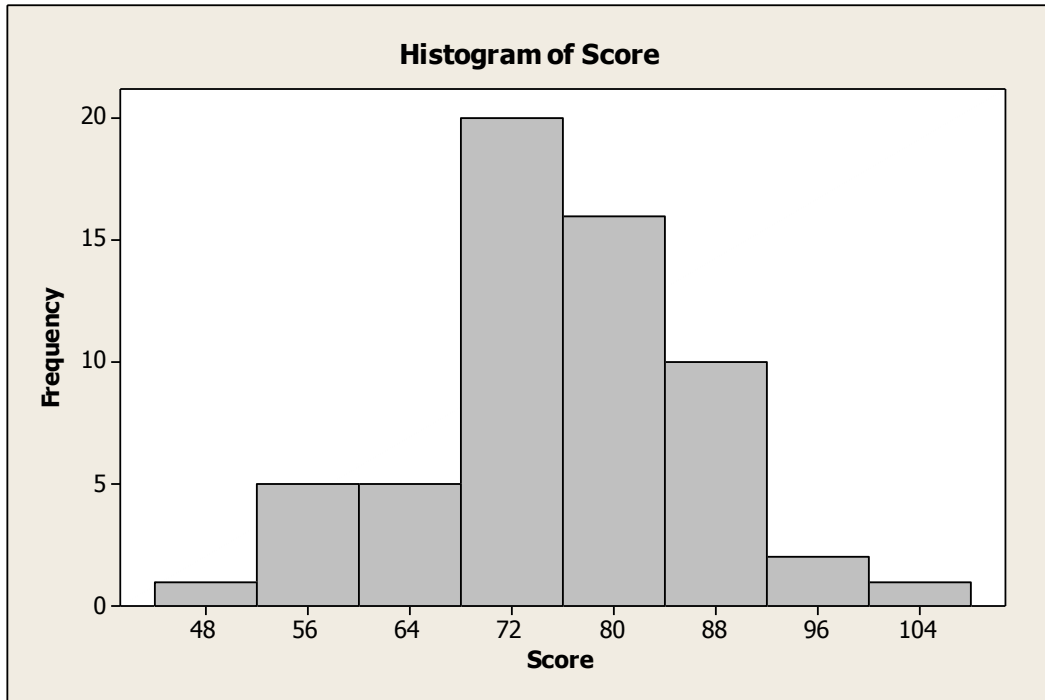


Figure 1h: Histogram with 8 bins

- (e) To draw the boxplot of Score data, click on the sequence Graph/Boxplot/Simple/OK/ then select Score as the variable, and click OK to obtain the boxplot shown in Figure 1i.

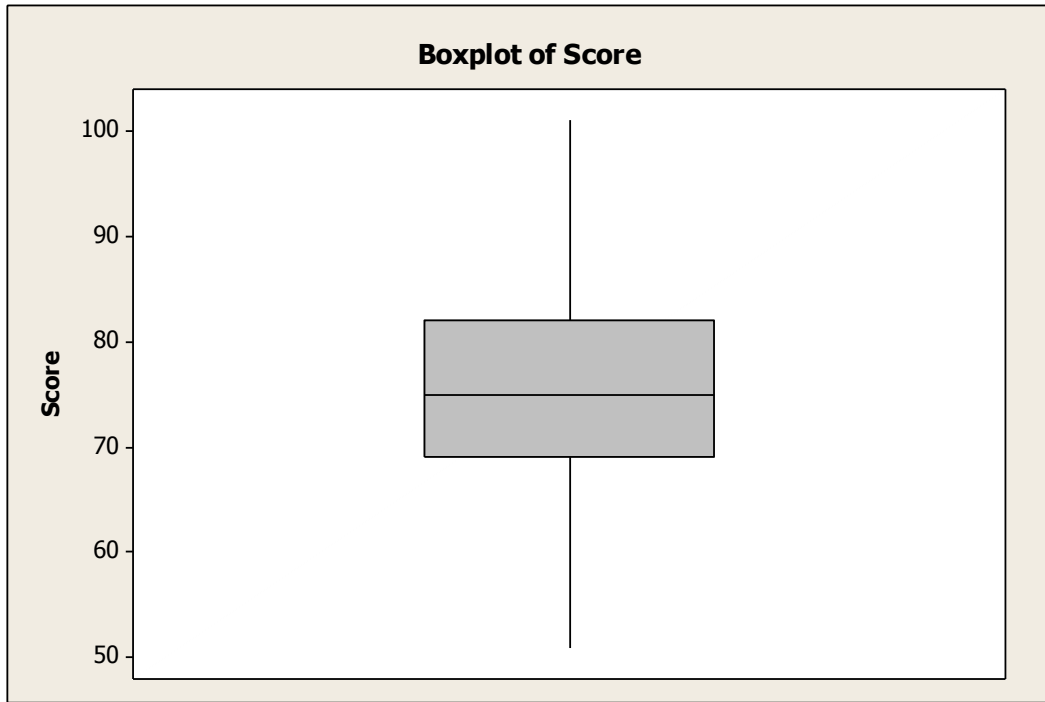


Figure 1i: Boxplot of Score

Visual Summarization of Data of Example 2

Open the data file Japan.xlsx in MINITAB.

2(a). Click on Graph/Scatterplot/Simple/OK, window in Figure 2a will open. Select Revenues as Y-variable, Book Equity as X-variable, and click OK

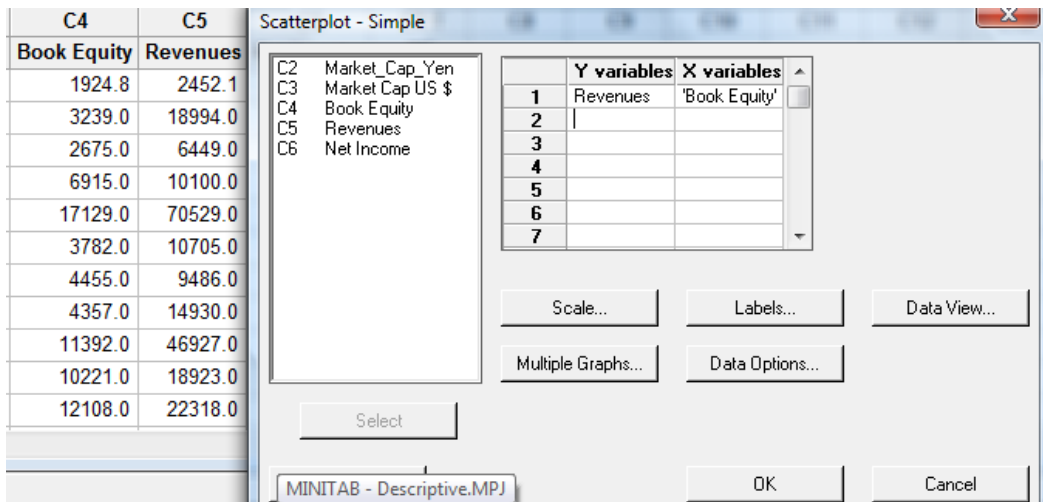


Figure 2a: Drawing Scatterplot in MINITAB

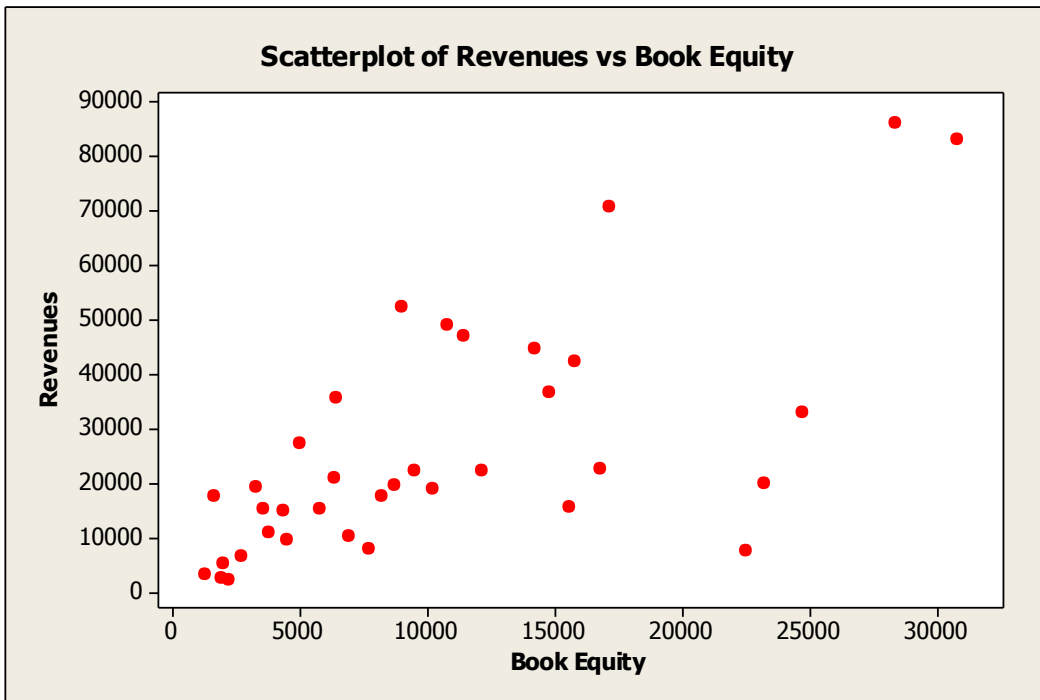


Figure 2b: Scatterplot from MINITAB

2(b) To draw the Matrix Plot in MINITAB, click on:

Graph/matrixplot/Simple/OK. This will open the following window (see Figure 2c). Select all variables (except Short Name which is non-numeric), and click OK to get the matrix plot of Figure 2d.

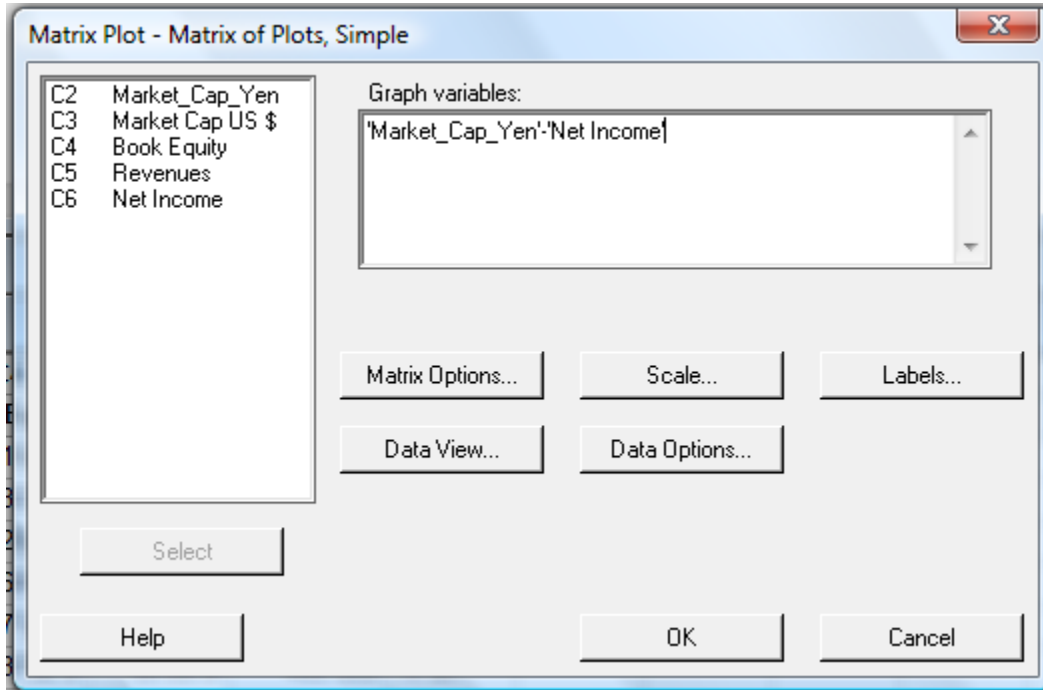


Figure 2c: Drawing a matrix plot in MINITAB

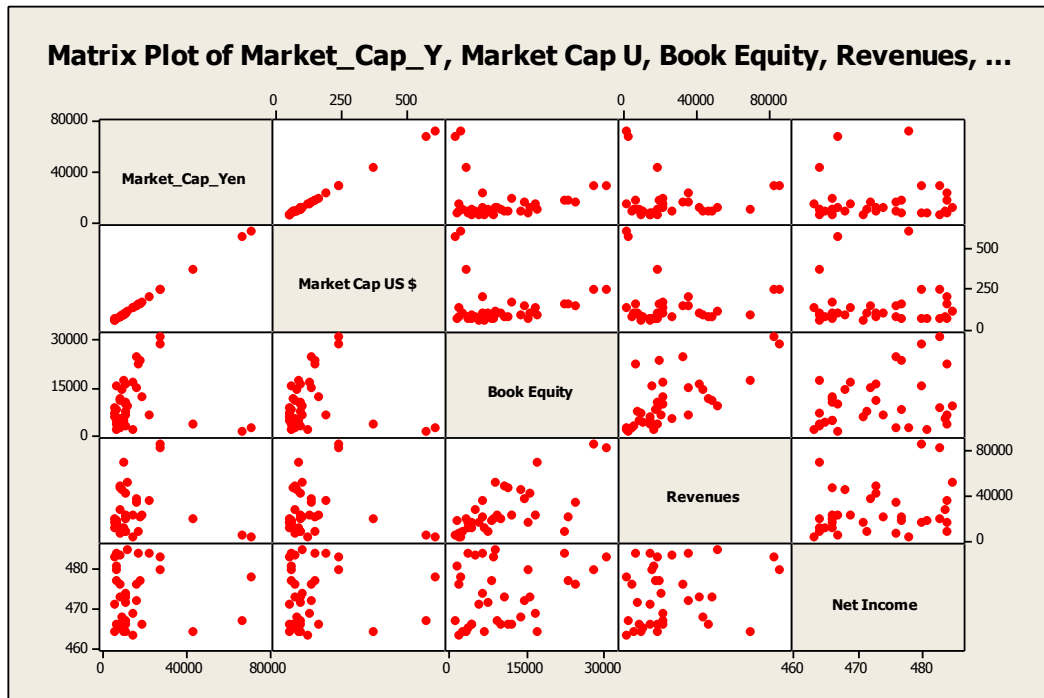


Figure 2d: Matrix plot from MINITAB
2(c) Correlation Matrix

Click on Stat/Basic Statistics/Correlation, which will open the window of Figure 2e. Select all quantitative variables, and click OK to get the correlation matrix shown below,

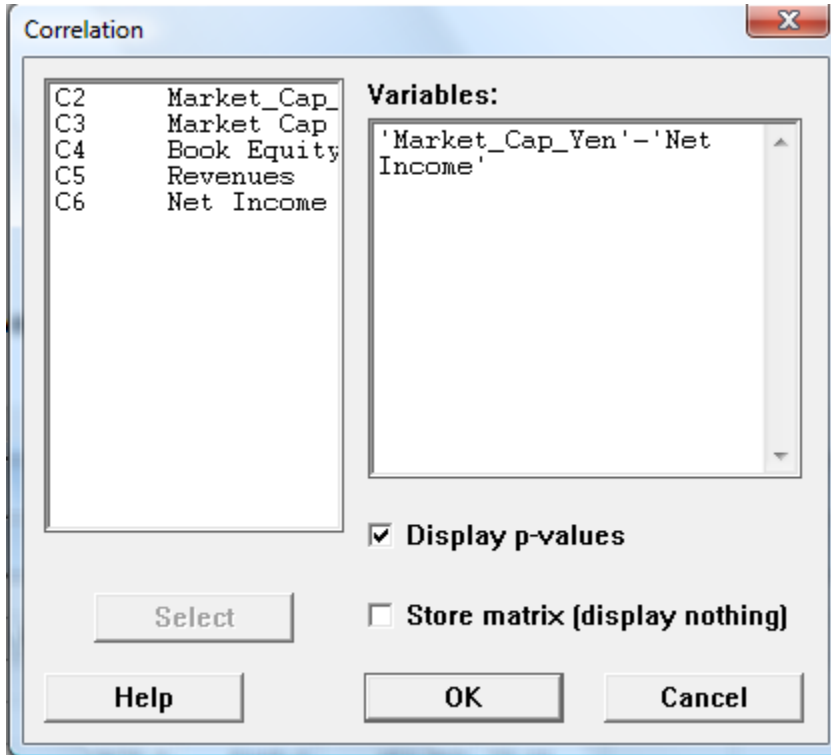


Figure 2e: Calculating correlation matrix in MINITAB

Correlations: Market_Cap_Y, Market Cap U, Book Equity, Revenues, Net Income

	Market_Cap_Y	Market Cap U	Book Equity	Revenues
Market Cap U	1.000 0.000			
Book Equity	-0.045 0.795	-0.045 0.795		
Revenues	-0.064 0.713	-0.063 0.713	0.676 0.000*	
Net Income	0.011 0.951	0.011 0.950	0.276 0.104	0.223 0.190

Cell Contents: Pearson correlation
P-Value

Corr(Revenues, Book Equity) = .676 is statistically significant since the P-value = 0.000 < .05. All other correlations above are insignificant.

2d. Descriptives by Grouping Variable

To calculate descriptive statistics for PE by the following categories:

- Market_Cap_US\$ 50 to 100
- 100 to 200
- 200 to 300
- > 300

first create a categorical variable MarketCapCode by clicking on:

Data/Code/Numeric to Numeric which will open the window of Figure 2f.

Select the variable Market Cap US \$ in the 'Code data from columns' box, enter Market Cap US \$ ranges in the Original values boxes, and categories in the New values boxes (see Figure 2f), then click OK. This will create a new variable MarketCapCode in the MINITAB file.

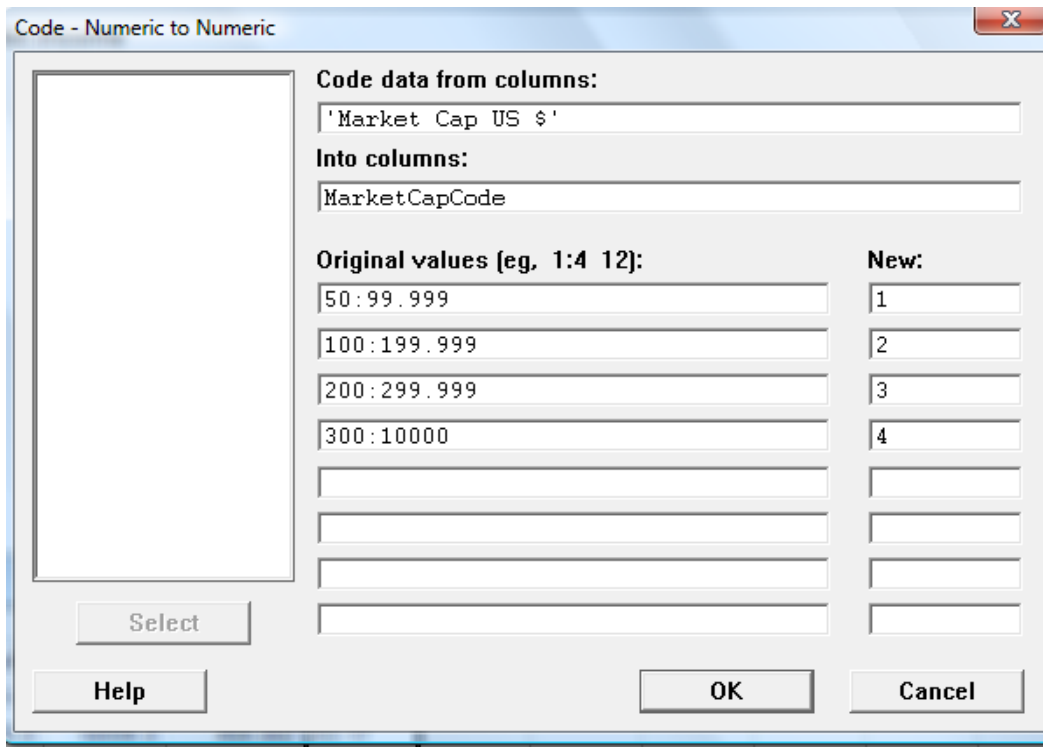


Figure 2f: Calculating MarketCapCode

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Next calculate the Descriptive Statistics for PE by the new variable MarketcapCode by clicking on

Stat/Basic Statistics/Display Descriptive Statistics, selecting PE as the variable and MarketCapCode as the 'By variable' (see Figure 2g),

and then clicking on OK. MINITAB output follows Figure 2g.

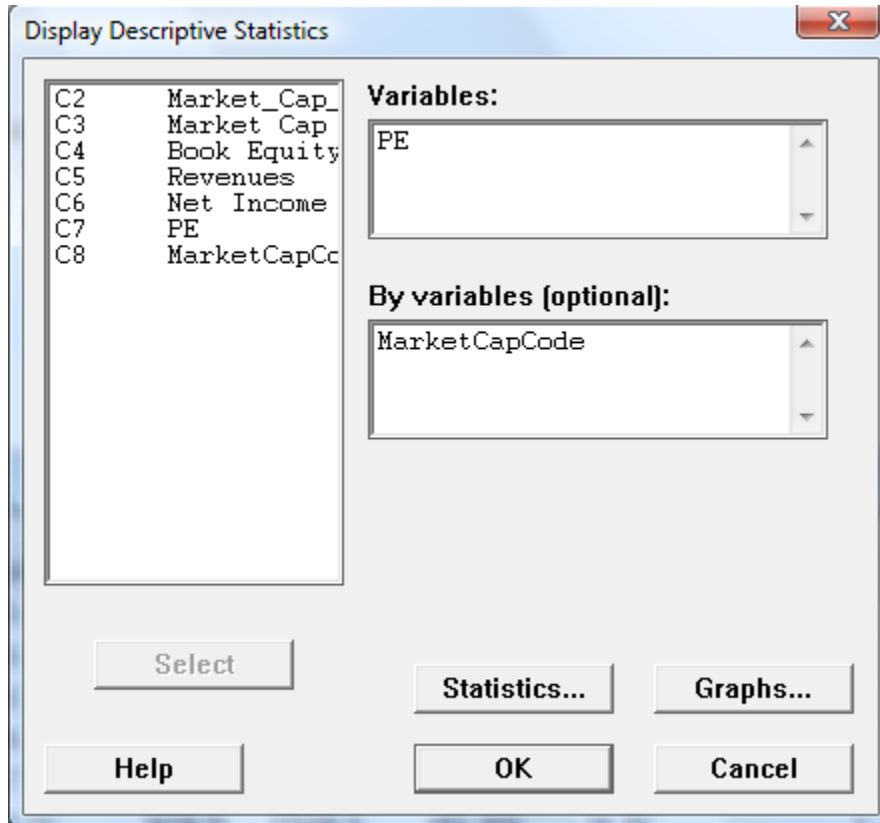


Figure 2g: Calculating Descriptive Statistics of PE By MarketCapCode

Descriptive Statistics: PE

Variable	MarketCapCode	N	N*	Mean	SE Mean	StDev	Minimum	Q1
PE	1	22	1	18.594	0.895	4.196	12.580	14.258
	2	8	0	36.29	1.83	5.19	31.16	31.88
	3	2	0	58.290	0.140	0.198	58.150	*
	4	3	0	128.9	18.0	31.1	93.2	93.2

Variable	MarketCapCode	Median	Q3	Maximum
PE	1	17.925	23.095	24.030
	2	34.92	40.13	46.26
	3	58.290	*	58.430
	4	143.6	149.9	149.9

2e. Histogram of PE is obtained by clicking on

Graph/Histogram/Simple/OK

Selecting PE as the variable, and then clicking OK. Figure 2h shows the histogram of PE.

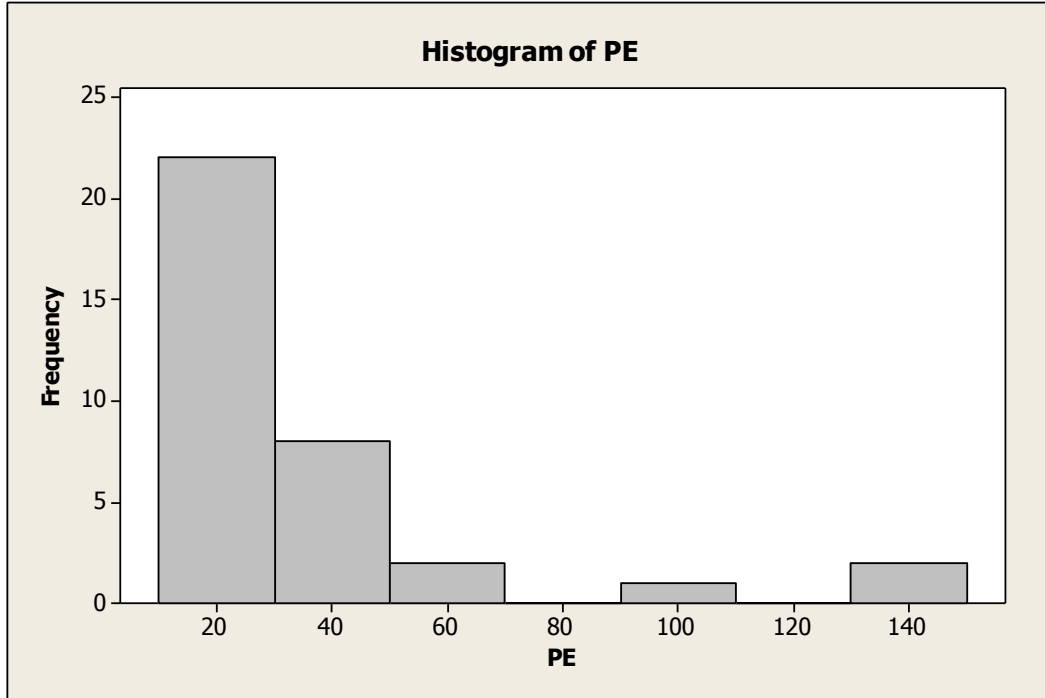


Figure 2h:Histogram of PE.

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2f)

To construct a crosstabulation for PE and Market_Cap_US using the following ranges:

PE range: 10 – 50, 50 – 100, > 100

Market_Cap_US range: 50 – 100 = 1, 100 – 200 = 2, 200 – 300 = 3, > 300 = 4,

create PECode using the above 3 ranges of PE following the method shown in 2e on page 11.

Once PECode has been created, click on:

Stat/Tables/Cross Tabulation and Chi-Square (see Figure 2i)

C8	C9	C10	C11	C12	C13	C14	C15	C16
MarketCapCode	PECode							
1	1							
2	1							
4	3							
3	2							
1	1							
1	1							
3	2							
1	1							
1	1							
2	1							
2	1							
1	*							
1	1							

Figure 2i: Crosstabulation in MINITAB

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Crosstabulation output is given below:

Tabulated statistics: PECode, MarketCapCode

Rows: PECode Columns: MarketCapCode

	1	2	3	4	All
1	22	8	0	0	30
2	0	0	2	1	3
3	0	0	0	2	2
Missing	1	0	0	0	*
All	22	8	2	3	35

Cell Contents: Count