CHAPTER 4 Appendix

Regression

If the relationship between two quantitative variables is linear, we generally want to fit the regression line that explains the relationship and allows us to predict the value(s) of the response variable given the value(s) of the predictor variable. We do this using the method of "least squares," which minimizes the sum of the squares of the vertical distances from the data points to the regression line (these vertical distances are called *residuals*).

Excel

1. **Data ➔ Data Analysis**
2. Select **Regression** in the Data Analysis menu box.
3. **OK**
4. Enter the cell range of the response data into the **Input Y Range** box, and enter the cell range of the explanatory data into the **Input X Range** box. If you have included column headings in the first row of your selection, be sure to check the Labels box in the regression dialog.
5. **OK**

The coefficients of the regression equation appear in the Coefficients column of the last table of output.

If you wish to produce a scatterplot with the least-squares regression line, create a scatterplot as described in the Chapter 3 appendix, and then click in the graph. Click the **+**. Check the box next to **Trendline**.

The Excel Video Technology Manuals on *Correlation, Fitted Line Plot, Linear Regression, Prediction,* and *Residual Plots* offer more help and examples.

1. **Analyze ➔ Fit Y by X**
2. Select the *y* variable, and click **Y, Response**.
3. Select the *x* variable, and click **X, Factor**.
4. **OK**
5. Click the Red Triangle ➔ **Fit Line**.

The JMP Video Technology Manuals: *Linear Regression* offers more help and examples.

Minitab

1. **Stat ➔ Regression➔ Regression ➔ Fit Regression Model**
2. Highlight and **Select** the response variable column into the **Response** box.
3. Highlight and **Select** the explanatory variable column into the **Continuous Predictors** box.
4. **OK**

If you wish to produce a scatterplot with the least-squares regression line, do the following pull-down sequence:

1. **Stat ➔ Regression ➔ Fitted Line Plot**
2. Highlight and **Select** the response variable column into the **Response** box.
3. Highlight and **Select** the explanatory variable column into the **Continuous Predictors** box.
4. **OK**

The Minitab Video Technology Manuals on *Correlation, Fitted Line Plot, Linear Regression, Prediction,* and *Residual Plots* offer more help and examples.

1. **Analyze ➔ Regression ➔ Linear**
2. Enter the response variable in **Dependent Variable**.
3. Enter the explanatory (predictor) variable in **Independent(s)**.
4. **OK**

The SPSS Video Technology Manuals on *Correlation, Fitted Line Plot, Linear Regression, Prediction,* and *Residual Plots* offer more help and examples.

CRUNCH IT!

1. **Statistics ➔ Regression ➔ Simple Linear**
2. Use the drop-down to select the response variable in **Dependent Variable**.
3. Use the drop-down to select the predictor variable in **Independent Variable**.
4. **Calculate**

For a fitted line plot, change the option in the Display drop-down.
The CrunchIt! Help video *Simple Linear Regression* offers more help and examples.

TI-83/-84

1. Press [STAT] and select **Edit** to enter the list editor.
2. In L1, enter the *x* values.
3. In L2, enter the *y* values.
4. Press [STAT], select **CALC**, and select **8:LinReg(a+bx)**. Press [ENTER].
5. Enter [2nd] [1] [,] [2nd] [2] after LinReg(a+bx) in the command window, and press [ENTER].
6. The correlation coefficient is returned along with the linear regression line if you have turned on Diagnostics (see the Correlation section in the Chapter 3 appendix)

For a fitted line plot, save the regression equation into the Y1 variable by modifying the command by following adding the following keystrokes: [,], [VARS], [▶] (to Y-Vars), [ENTER] (for Function) and [ENTER] (for Y1). The command should look like this: LinReg(a+bx) L1,L2,Y1. Press [ZOOM] [9] to display the scatterplot again.

The TI Video Technology Manuals on *Correlation, Fitted Line Plot, Linear Regression, Prediction,* and *Residual Plots* offer more help and examples.

The simplest form of a regression command is

```
> lm(mydat$yvar~mydat$xvar)
```

To replicate the output from the text and get a complete table of results, use two commands like these:

```
> model<-lm(mydat$yvar~mydat$xvar)
> summary(model)
```

The *R* Video Technology Manuals on *Correlation, Fitted Line Plot, Linear Regression, Prediction,* and *Residual Plots* offer more help and examples.