

DIRECTIONS:

- Some of the exercises listed below include special instructions which modify or clarify textbook instructions.
 - Use a 5% significance level for tests unless noted otherwise.
 - Data sets for some exercises are available on the MINITAB Data Sets link.
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Textbook Exercises: Exercises have been *grouped together* around the same word problem, for convenience. (The word problems are labeled A, B, C, etc.)

A. Using Population Regression Lines

- Exercise 10.3 (p. 577)
- Exercise 10.4

B. Research and Development Spending

- Exercise 10.5 (p. 579)

Helpful hints:

- * For part (a), make a scatterplot with MINITAB.
- * For part (b), enter the data into your calculator and use the calculator's *regression* function to find the least-squares equation.
- * For the hand calculations in part (c), use the formula for regression sample variance shown in the Topic 8 Part 1 notes:

$$s^2 = \frac{\sum_{i=1}^n (y_i - \hat{y}_i)^2}{n - 2}$$

Add more parts to this exercise:

- (f) Make a Fitted-Line Plot in MINITAB:

Stat > Regression > Fitted Line Plot

What value does the plot provide for regression standard deviation s ? (Include all available decimal places in your answer.) Is this the same (except for roundoff error) as you calculated by hand in (c)?

- (g) Find the standard deviation s_y for Spending. Does regression on Years reduce the standard deviation for predicting Spending?
- (h) There is another way besides comparing standard deviations to measure how well regression is working. How much of the variation in Spending is explained by Years in the data?

C. Earnings for Female Bank Employees

These questions refer to Table 10.1 in the textbook, which is also discussed as Topic 8 Part 2 Example 7 in the notebook. (Refer to page 76 in the Notebook.)

Download the Table 10.1 data from the website. Use MINITAB to make a Fitted Line Plot similar to the plot shown on page 76 in the notes. Also reproduce the full regression output shown in the notes:

```
Stat > Regression > Regression . . . . . > Options  
> (Enter 125 for "Prediction intervals for new observations") > OK > OK
```

- Exercise 10.1 (p. 575)
- Exercise 10.2
- Exercise 10.22 (p. 592) (Also interpret the confidence interval.)
Ignore references to Excel output. Use your MINITAB output instead.
- Exercise 10.33 (p. 598)
Add part (c):

(c) Re-do the Fitted Line Plot with a special option:

```
Stat > Regression > Fitted Line Plot  
> (Choose response = Wages, predictor = LOS) > Options  
> (Select Display confidence interval, Display prediction interval)  
> OK > OK
```

Questions to answer for part (c):

1. Can you guess which color shows the confidence interval for mean wages for all employees? Which color shows the prediction interval?
2. Use the graph to “eyeball” a rough 95% estimate of mean weekly wages for all employees with 100 months of service.
3. Use the graph to “eyeball” a rough 95% estimate for the weekly wage of an individual employee with 200 months of service.

(continued)

D. T-Bills and Inflation

The book refers to Excel output. Ignore those directions and instead create your own MINITAB output from the Table 10.2 data.

- Exercise 10.6 (p. 584)
- Exercise 10.7
You can use MINITAB output instead of hand calculations for this one, if you wish.
- Exercise 10.8
Also interpret the confidence interval.
- Exercise 10.23 (p. 592)
Also interpret the confidence interval in (d).
- Exercise 10.34 (p. 598)
Go ahead and reproduce the MINITAB output shown at the bottom of page 598:
Stat > Regression > Regression > Options
> (Enter 3.7 for "Prediction intervals for new observations") > OK > OK
- Exercise 10.42 (p. 601)
Textbook Correction: The book means to refer to Figure 10.16 on p. 598 (not Figure 10.10 on p. 586.)

E. Stocks and Bonds

- Exercise 10.26 (p. 592)
Add part (d) to this exercise:
Predict net cash flow into bonds in the year 2009 with 95% certainty if the net cash flow into stocks is \$100 billion in 2009.

F. Computer Memory

- Exercise 10.31 (p. 594)
Change instructions for part (a): Make a Fitted-Line Plot and a Residuals Plot:
Stat > Regression > Fitted Line Plot > Graphs
> Select Residuals versus fits > OK > OK
Questions to answer for part (a):
 1. What is the least-squares equation for predicting DRAM over time?
 2. What does the residuals plot imply about the regression of DRAM by Year?**Add part (d) to this exercise:**
Predict DRAM for the year 2002 with 90% certainty.

(continued)

G. Blood Alcohol Content

- Exercise 10.30 (p. 593)

Add part (c) to this exercise:

Find and interpret a 90% confidence interval for the slope β_1 .

- Exercise 10.45 (p. 601)

H. Predicting Water Quality

- Exercise 10.13 (p. 589)

Ignore the book's directions for this exercise. Follow these directions instead:

- (a) Make a Fitted Line Plot. Also obtain the full MINITAB regression output in the Session Window. What is the sample regression equation?

- Exercise 10.14 (p. 590)

Ignore the book's directions for this exercise. Follow these directions instead:

- (a) Make a Fitted Line Plot. Also obtain the full MINITAB regression output in the Session Window. What is the sample regression equation?
- (b) If you had to choose between the predictors Area and Forest to predict IBI, which of these two predictors would you choose? Explain your choice, based on a 10% significance level.
- (c) Suppose you wish to predict with 90% certainty the IBI for Stream A, whose watershed covers 50 square km and is 30% forested. Provide the answer from your chosen model.

- (d) Now suppose that you discover that a data-entry error has been made in Table 10.3: The correct Area corresponding to (IBI = 32) is actually 121, not 21!

Make the data correction (on line 13) in the MINITAB worksheet for Table 10.3. Redo the Fitted Line Plot and Regression for the predictor Area. What is the new regression equation?

The corrected data point (121, 32) is called an *outlier* in the Table 10.3 scatterplot. Can you explain why it has this name? Outliers can make a strong impact upon regression results.

- (e) Has the data correction changed your choice of best predictor variable? Why or why not? What is your 90% prediction for IBI in Stream A now?

(end of assignment)