

Stat 401 Minitab 17 Project 5

The following instructions are for Minitab 17. The commands and menu selections for Minitab 15, Minitab 16 and Minitab Express should be similar. (If there are differences, I suggest you use the Help menu, or Internet search, to help figure things out.)

Purpose: I. To use MINITAB to determine the estimated linear regression equation, determine the coefficient of determination, conduct a hypothesis test of β_1 , and determine the correlation coefficient.

Reading: Text, Chapter 12 on Linear Regression.

Turn in: A. Print outs of the session windows for each of the three hypothesis tests.

B. The answers to the questions as indicated below.

General Instructions: What follow are the Minitab commands for linear regression analysis. Words in capital letters followed by the symbol > indicate a sequence of menu items to be selected/clicked.

I. Linear Regression Analysis – Text homework exercise #4 (9th edition only - not in the 8th edition)

[You'll get the data from text exercise #4, but answer a whole lot more than the text asks for.]

A. Begin by opening Minitab. Type the title “transpiration” in the box below C1 and type the title “ammonium concentration” in the box below C2.

Enter the corresponding data values in each appropriate column. (The numbers should be right-justified, indicating that they are being recognized as numeric data.)

STAT > REGRESSION > FITTED LINE PLOT ...

Select the appropriate columns for X and Y .

Make sure “Linear” is selected.

Click on the “Options...” button.

Check the boxes for “Display confidence interval” and “Display prediction interval”.

Set the appropriate “Confidence level:” for $\alpha = 0.01$.

In the “Title” dialog box enter Ammonium Concentration vs. Transpiration.

Click on the “OK” button in the “Options...” dialog box.

Click on the “OK” button in the “Fitted Line Plot” dialog box.

B. Answer the following.

1.a. Copy and paste the scatterplot into your answer page. (Clicking in the blue space surrounding the scatterplot will ensure you copy title and axis labels with the scatterplot.)

1.b. Based *only* on the scatterplot, does the data indicate a positive or negative correlation? Does the data indicate a weak, moderate or strong correlation? Justify your answers.

2.a. State the estimated linear regression equation found by Minitab. (Use variables rather than word descriptions.)

2.b. Determine estimated values for $\mu_{Y=10}$ and $\mu_{Y=25}$. Which of these two estimates would provide a smaller confidence interval? Justify your answer.

3. State the estimated variance for ammonium concentration vs. transpiration found by Minitab.

4. State the sample coefficient of determination (unadjusted) for ammonium concentration vs. transpiration found by Minitab and interpret its value in the context of ammonium concentration vs. transpiration.

5.a. State the hypotheses for a model utility test of the estimated linear regression equation.

5.b. State the test statistic calculated by Minitab, and state its value.

5.c. State the p -value found by Minitab.

5.d. State whether this p -value would indicate “reject the null hypothesis” or “fail to reject the null hypothesis” at the given level of significance.

5.e. State a conclusion in words, in the context of the given situation.

6. State the sample correlation coefficient for this sample data and interpret its value in the context of ammonium concentration vs. transpiration.