

1. Page 147, Problem 3.4 (c, d, h, plus an additional question).
  - In part c, instead of stem-and-leaf plot, prepare a histogram for the residuals and comment.
  - In addition, answer the following question:
    - e. Prepare a Normal Q-Q plot for the residuals and comment. Use statistical software to conduct test(s) to check the normality assumption of the residuals at  $\alpha = 0.10$ .

Additional notes on tests for Normality:

- To conduct a test for Normality in SPSS, please refer to file p.7 in file *Lab1\_SLR.pdf*. SPSS conducts 2 tests for Normality: the Kolmogorov-Smirnov Test and the Shapiro-Wilk Test.
  - To conduct the test for Normality in R users, use the following function to conduct the Shapiro-Wilk Test. (see *Lab2\_SLRCompleteExample.R*)  

```
> shapiro.test(your.lm.output$resi)
```
  - Both the Shapiro-Wilk Test and the Kolmogorov-Smirnov Test for Normality needs that assumption that the data (in this case, the residuals) have equal variance. Between these two tests, if there is no preference in your own research/study field, I recommend the Shapiro-Wilk Test because it often has higher power than the Kolmogorov-Smirnov Test, especially when the sample size is relatively small. When the sample size is small, however, the statistical power of either test is low.
2. Following is the ANOVA table for the Copier Maintenance data we analyzed last time. Use the facts that: (a)  $SS_{PE} = 2797.658$ , and (b) the predictor (Copier) has 10 distinct values, to further develop the ANOVA table so that we can conduct F-test for lack-of-fit. State the hypothesis, rejection rule and your conclusion for the test (at Type I error rate = 0.05). Then, use SPSS or other statistical software to confirm your result.

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	76960.423	1	76960.423	968.657	.000(a)
	Residual	3416.377	43	79.451		
	Total	80376.800	44			
a Predictors: (Constant), X_COPIER						
b Dependent Variable: Y_TIME						

3. Page 151, Problem 3.17 (skip b).

(This problem may be moved to HW 4. I will update on Monday, Sept. 24.)

4. Review, or familiar yourself with, the following concepts in linear/matrix algebra: vector, matrix, matrix addition, matrix multiplication, the transpose of a matrix, and the inverse of a matrix. You don't need to worry about the calculation, though.

----- This is the end of HW 3. -----