Lab 3

Lab 3 (80 pts.) - Assessing the Normality of Data Objectives: Creating and Interpreting Normal Probability Plots (QQ plots)

Please submit the data for parts A, B and C ONLY (clearly labeled) <u>at the end of the</u> <u>lab report</u> in an Appendix.

A. (10 points) Normal random numbers (no data file required) Use software to generate 10 observations from a normal distribution with mean, $\mu = 5$ and standard deviation, $\sigma = 12$.

- 1. (3 pts.) Code
- 2. (3 pts.) Make an appropriate histogram of these observations. How does the shape of the histogram compare with a normal density curve?
- 3. (4 pts.) Make a normal probability plot of the data. Does the plot suggest any important deviations from normality? Please provide specifics to explain your answer.

(You must submit your data for this question. No credit will be given without data.)

B. (10 points) Normal random numbers (no data file required) Use software to generate 100 observations from a normal distribution with mean, $\mu = 5$ and standard deviation, $\sigma = 12$.

- 1. (2 pts.) Code:
- 2. (3 pts.) Make an appropriate histogram of these observations. How does the shape of the histogram compare with a normal density curve?
- 3. (3 pts.) Make a normal probability plot of the data. Does the plot suggest any important deviations from normality? Please provide specifics to explain your answer.
- 4. (2 pts.) Are the plots from part A and part B the same or different? Please explain your answer. Remember both of these parts are from the same normal distribution.

(You must submit your data for this question. No credit will be given without data.)

C. (40 points) Random numbers from other distributions (no data file

required.) Use software to generate 100 observations from the distributions called (I) right skewed, (II) left skewed, (III) short tailed and (IV) long tailed in the tutorial. The format of the lab report should be: a) which distribution you are using (I, II, III, or IV), b) the histogram with answer to 2, 3) the normal probability plot with answer to 3.

- 1. (2 pts.) Code:
- 2. (4 pts. for each distribution) Make an appropriate histogram of these observations. Please describe the shape of the distribution. How does the histogram compare with a normal density curve?
- 3. (4 pts. for each distribution) Make a normal probability plot of your data. Please describe the shape of the plot. Does the plot suggest any important deviations from normality?

(You must submit your data for this question. No credit will be given without data.)

D. (10 points) The distribution of the air time of flights (data file: airline2008NovS

cleaned) A flight analyst is interested in the normality of the elapsed air time of the fights (AirTime).

- 1. (3 pts.) Code:
- 2. (3 pts.) Make an appropriate histogram of all of these observations. Which distribution do you think this data is? (normal, right skewed, left skewed, short tailed or long tailed). Please explain your answer.
- 3. (4 pts.) Make a normal probability plot of all of the data. Which distribution do you think this data is? (normal, right skewed, left skewed, short tailed or long tailed). Please explain your answer.

E. (10 points) Comparison of data – GROUP (submitted separately on Blackboard).

This is a group assignment and is due on Blackboard at Midnight on Friday, Feb. 12. Each group must consist of 3-4 people and will submit only one combined report. Be sure that the names of each person with their section number or time are at the top of the page. If your grade is not on Blackboard (give us a week to grade the assignment), submit a regrade request with the name and sections of your group members. Please indicate which person submitted the information.

- 1. (3 pts.) Present all of the graphs for Parts A, B and C from all of the members of the group where the graphs for each situation are grouped together. Therefore, there will be 3-4 histograms and 3-4 normal probability plots for each type of random number simulation (6 sets in total).
- 2. (7 pts.) After each of the six sets of plots, please answer the following question: "Are these plots the same or different? If they are different, please propose a possible explanation."