

Lab 4 - Assessing the Normality of Data

Objectives: Creating and Interpreting Normal Quantile Plots

Please submit the data for all of the questions (clearly labeled) at the end of the lab report as an Appendix.

A. (10 points) Normal random numbers (no data file required) Use software to generate 10 observations from a normal distribution with $\mu = 2$ and $\sigma = 10$.

1. (5 pts.) Make an appropriate histogram of these observations. How does the shape of the histogram compare with a normal density curve?
2. (5 pts.) Make a normal quantile 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 $\mu = 2$ and $\sigma = 10$.

1. (3 pts.) Make an appropriate histogram of these observations. How does the shape of the histogram compare with a normal density curve?
2. (3 pts.) Make a normal quantile plot of the data. Does the plot suggest any important deviations from normality? Please provide specifics to explain your answer.
3. (4 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. For each of the distributions answer the following questions (the answers for each distribution should be right after each other):

1. (5 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?
2. (5 pts. for each distribution) Make a normal quantile 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) How long are customer service center calls? (data file: eg01-15calls80.txt) We have data on the lengths of all 31,492 calls made to the customer service center of a small bank in a month. The table below displays the lengths of the first 80 calls, in seconds.

TABLE 1.2 Service Times (Seconds) for Calls to a Customer Service Center

| | | | | | | | |
|-----|-----|-----|-----|------|-----|-----|-----|
| 77 | 289 | 128 | 59 | 19 | 148 | 157 | 203 |
| 126 | 118 | 104 | 141 | 290 | 48 | 3 | 2 |
| 372 | 140 | 438 | 56 | 44 | 274 | 479 | 211 |
| 179 | 1 | 68 | 386 | 2631 | 90 | 30 | 57 |
| 89 | 116 | 225 | 700 | 40 | 73 | 75 | 51 |
| 148 | 9 | 115 | 19 | 76 | 138 | 178 | 76 |
| 67 | 102 | 35 | 80 | 143 | 951 | 106 | 55 |
| 4 | 54 | 137 | 367 | 277 | 201 | 52 | 9 |
| 700 | 182 | 73 | 199 | 325 | 75 | 103 | 64 |
| 121 | 11 | 9 | 88 | 1148 | 2 | 465 | 25 |

1. (5 pts.) Make an appropriate histogram 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.
2. (5 pts.) Make a normal quantile plot 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. This is a group assignment and is due in class on Monday, Oct. 6. Each group must consist of 3-4 people (in any of my sections) and will submit a combined hardcopy report. It is allowed to tape the graphs of group members on the report. Be sure that the names and sections of each person are at the top of the page.

1. (3 pts.) For Parts A, B and C, present all of the graphs for each part from each student ordered by part. Therefore, there will be 3-4 histograms and 3-4 normal quantiles plots for each type of random number simulation (6 in total).
2. (7 pts.) After each of the six sets of plots, please answer the following question: "Are each of these plots the same or different? If they are different, please propose a possible explanation."