

Project-1
QBA775- Quantitative Methods
Due-09-17-2023 at 11:59 PM

- You can get help or clarification from the instructor.
- You are permitted to use the course notes, books, internet, Rscript posted on blackboard, and any other materials you like.
- For each question, you need to interpret your results fully. You should type your report.
- You should include your R-script (R-code) as an appendix and cite your output correctly.
- You can upload your labwork file under the lab assignment folder in Blackboard.
- Late submission is not accepted.
- Data are available under the data folder in Blackboard.
- Rstudio is required throughout this lab assignment.

1. [25 pts] The **doctorsdata.xls** gives the number of medical doctors per 100,000 people in each state.
 - (a) [5 pts] Why is the number of doctors per 100,000 people a better measure of the availability of health care than a simple count of the number of doctors in a state?
 - (b) [5 pts] Make a graph that displays the distribution of doctors per 100,000 people. Write a brief description of the distribution. Are there any outliers? If so, can you explain them?
 - (c) [5 pts] Do you expect the mean to be greater than the median, about equal to the median, or less than the median? Why? Calculate mean and median and verify your expectations.
 - (d) [5 pts] If you remove outlier, do you expect mean and median to change more? Why? Calculate both measure(mean and median) for the remaining state and verify your expectations.
 - (e) [5 pts] Construct boxplot of doctors and interpret it.

2. [15 pts] **A football team** The University of Miami Hurricanes have been among the more successful teams in college football. A **football.xls** gives the weights in pounds and positions of the players on the 2002 team. The positions are quarterback(QB), running back(RB), offensive line(OL), wide receiver(WR), tight end (TE), kicker/punter(KP), defensive back(DB), linebacker (LB), and defensive line (DL).
 - (a) [5 pts] Make side-by-side boxplots of the weights for all positions.
 - (b) [5 pts] Briefly compare the weight distributions. Which position has the heaviest players overall? Which has the lightest?
 - (c) [5 pts] Are any individual players outliers within their position?

3. [25 pts] **Patient Waiting Times.** Suppose that the average waiting time for a patient at a physician's office is just over 29 minutes. To address the issue of long patient wait times, some physicians' offices are using wait-tracking systems to notify patients of expected wait times. Patients can adjust their arrival times based on this information and spend less time in waiting rooms. The following data show wait times (in minutes) for a sample of patients at offices that do not have a wait-tracking system and wait times for a sample of patients at offices with such systems.(**patientwaits.xls data**)
 - (a) [5 pts] What are the mean and median patient wait times for offices with a wait-tracking system? What are the mean and median patient wait times for offices without a wait-tracking system?
 - (b) [5 pts] What are the variance and standard deviation of patient wait times for offices with a wait-tracking system? What are the variance and standard deviation of patient wait times for visits to offices without a wait-tracking system?
 - (c) [5 pts] Create a boxplot for patient wait times for offices without a wait-tracking system.
 - (d) [5 pts] Create a boxplot for patient wait times for offices with a wait-tracking system.
 - (e) [5 pts] Do offices with a wait-tracking system have shorter patient wait times than offices without a wait-tracking system? Explain.

4. [35 pts] In 1996 the firm Standard and Poor's DRI predicted that the cities listed in the next column would experience the fastest growing job markets in the United States over the next 3 years and predicted their growth rates, given in the following data set. (**jobgrowth data**)
- [5 pts] Make a suitable display of the growth rates.
 - [5 pts] Summarize the central growth rate with a median and mean. Why do they differ?
 - [5 pts] Given what you know about the distribution, which of these measures does the better job of summarizing the growth rates? why?
 - [5 pts] Summarize the spread of the growth rate distribution with a standard deviation and IQR.
 - [5 pts] Given what you know about the distribution, which of these measures does the better job of summarizing the growth rates? why?
 - [5 pts] If we were to omit Las Vegas from the data, how would you expect the mean, median, standard deviation, and IQR to change? Explain your expectations for each.
 - [5 pts] Write a brief report about these growth rates.
5. [10 pts] **The color of your car.** Here is a breakdown of the most popular colors vehicles made in North America during the 2001 model year;

Color	Percent
Silver	21.0%
White	15.6%
Black	11.2%
Blue	9.9%
Green	13.2%
Medium red	6.9%
Brown	5.6%
Gold	4.5%
Bright red	4.3%
Grey	2.0%

- [5 pts] What percent of vehicles are some other color?
 - [5 pts] Make a bar graph of color data. Would it be correct to make a pie chart if you added an "other" category?
6. [15 pts] The data major.xls collected from the student attending an Basic Business Statistics course at the Missouri State University. These data include sex,height, number of years in college, and the general area of intended major[Humanities(H);Social Science(S);Biological Science(B);Physical Science(P)].
- [5 pts] Summarized the data of "intended major" in frequency table.
 - [5 pts] Summarize the data of "year in college" in a frequency table and draw histogram.
 - [5 pts] Construct boxplot of Height in Inches by sex. Interpret it.

7. [25 pts] **Class of 2000.** Prior to graduation, a high school class of 2000 was surveyed about their plans. The following table displays the results for white and minority students. (The "Minority" group included African-American, Asian, Hispanic, and Native American students.)

Plans	White	Minority
4-years college	198	44
2-year college	36	6
Military	4	1
Employment	14	3
Others	16	3

- (a) [5 pts] What percent of the graduates are white?
- (b) [5 pts] What percent of the graduates are planning to attend a 2-year college?
- (c) [5 pts] What percent of the graduates are white and planning to attend 2-year college?
- (d) [5 pts] Create a graph comparing the plans of white and Minority students.
- (e) [5 pts] Do you see any important differences in the post graduation plans of white and minority students? Write a brief summary of what these data show, including comparisons of conditional distributions.