Business Analytics Yue Summer 2025

Assignment #1, Due 6/30/2025 or 7/1/2025

1. In class we learn there are four types of data. Based on things related to weather, give your examples of each type of data. Also, show that it is possible to create unreasonable interpretation if falsely categorizing the data type.
2. **Airline Fares.** The mean airfare for flights departing from Buffalo Niagara International Airport during the first three months of 2017 was $320.51. Assume the standard deviation for this population of fares is known to be $80. Suppose a random sample of 60 flights departing from Buffalo Niagara International Airport during the first three months of 2018 is taken.
   (a) If the mean and standard deviation of the population of airfares for flights departing from Buffalo Niagara International Airport didn't changed between the first three months of 2017 and the first three months of 2018, what is the probability the sample mean will be within $20 of the population mean cost per flight?
   (b) What is the probability the sample mean will be within $10 of the population mean cost per flight?
3. **Best Paying College Degrees.** Each year America.EDU ranks the best paying college degrees in America. The following data show the median starting salary, the mid-career salary, and the percentage increase from starting salary to mid-career salary for the 20 college degrees with the highest mid-career salary (America.EDU website).

Degree	Starting Salary	Mid-Career Salary	% Increase
Aerospace engineering	59,400	108,000	82
Applied mathematics	56,400	101,000	79
Biomedical engineering	54,800	101,000	84
Chemical engineering	64,800	108,000	67
Civil engineering	53,500	93,400	75
Computer engineering	61,200	87,700	43
Computer science	56,200	97,700	74
Construction management	50,400	87,000	73
Economics	48,800	97,800	100
Electrical engineering	60,800	104,000	71
Finance	47,500	91,500	93
Government	41,500	88,300	113
Information systems	49,300	87,100	77
Management info. systems	50,900	90,300	77
Mathematics	46,400	88,300	90
Nuclear engineering	63,900	104,000	63

Petroleum engineering	93,000	157,000	69
Physics	50,700	99,600	96
Software engineering	56,700	91,300	61
Statistics	50,000	93,400	87

(a) What are the averages of starting and mid-career salary?

(b) Using a class width of 10, construct a histogram for the percentage increase in the starting salary. Comment on the shape of the distribution.

(c) Develop a scatter diagram with the starting salary on the horizontal axis and the percentage increase in the starting salary on the vertical axis. Does there appear to be a relationship between these two variables? Discuss.

(d) What is the sample correlation coefficient between starting salary and mid-career salary? Are there any unusual observations? Discuss.

4. **Multiple-Choice Exam.** Consider a multiple-choice examination with 50 questions. Each question has four possible answers. Assume that a student who has done the home- work and attended lectures has probability .75 of answering any question correctly.

   (a) A student must answer 43 or more questions correctly to obtain a grade of A. What percentage of the students who have done their homework and attended lectures will obtain a grade of A on this multiple-choice examination?

   (b) A student who answers 35 to 39 questions correctly will receive a grade of C. What percentage of students who have done their homework and attended lectures will obtain a grade of C on this multiple-choice examination?

   (c) A student must answer 30 or more questions correctly to pass the examination. What percentage of the students who have done their homework and attended lectures will pass the examination?

   (d) Assume that a student has not attended class and has not done the homework for the course. Furthermore, assume that the student will simply guess at the answer to each question. What is the probability that this student will answer 30 or more questions correctly and pass the examination?

5. **Annual Restaurant Expenditures.** The 92 million Americans of age 50 and over control 50 percent of all discretionary income. AARP estimates that the average annual expenditure on restaurants and carryout food was $1873 for individuals in this age group. Suppose this estimate is based on a sample of 80 persons and that the sample standard deviation is $550.

(a) At 95% confidence, what is the margin of error?

(b) What is the 95% confidence interval for the population mean amount spent on restaurants and carryout food?

(c) What is your estimate of the total amount spent by Americans of age 50 and over on restaurants and carryout food?

(d) If the amount spent on restaurants and carryout food is skewed to the right, would you expect the median amount spent to be greater or less than $1873?