

QMM 250

Problem Set #1

Due—Wednesday, February 3 at 8:40am.

Instructions: The questions and problems below are like the questions and problems you will see on my exams. In answering, *show all of your work* and give *complete explanations*. I do not encourage you to work in groups. After all, you will have to think for yourself on the exams. To the extent that you do work with a colleague, be absolutely sure to give answers in your own words. Duplicate answers will automatically be assigned a 0.0.

1. Consider the following data:

{1 1 2 5 6 7 7 8 11 14}

- a. Assuming this is a sample of data, use your calculator to determine the mean, median, variance, and standard deviation of the data.
- b. If the data are a population, how do your calculations change? Explain and show.
2. Citibank recorded the number of customers using an ATM during the noon hour on 32 consecutive work days. Here are the data and relevant descriptive statistics:

<u>Number of ATM customers.</u>				<u>Descriptive Statistics</u>	
9	23	26	33	Mean	27.3
15	24	27	34	Median	26.0
16	25	30	35	Standard Deviation	7.9
18	25	31	35	Sample Variance	61.7
18	25	32	37	Range	33
19	26	32	39	Minimum	9
21	26	32	40	Maximum	42
21	26	33	42		

- a. Construct the one-, two-, and three-standard deviation intervals about the mean.
- b. What is the *empirical rule*? Do the ATM data obey the empirical rule? Why or why not?
- c. Determine the inter-quartile range of these data.
- d. “The inter-quartile range and the one standard deviation interval about the mean tell us somewhat the same thing.” Explain the meaning of the quote.

3. Use the rules of summation to show that $\sum_{i=1}^n (x_i - \bar{x}) = 0$. Explain your reasoning at each step.
- 4.
- Draw a basic boxplot for the income variable in the HR Manager Data (found on my web page). Using your boxplot, comment on the central tendency, dispersion, and distribution of the incomes of human resource managers.
 - Re-draw your boxplot from part a so that it can be used to check for unusual observations and for outliers. (You'll need to determine inner and outer fences, etc.) Using the revised boxplot, do the income data contain unusual observations and/or outliers? Explain.
5. Given $P(A) = .6$, $P(B) = .4$, and $P(A \cap B) = .3$:
- Find $P(A \cup B)$.
 - Find $P(A|B)$.
 - Find $P(B|A)$.
 - Are A and B independent events? Why or why not?
 - Are A and B mutually exclusive events? Why or why not?