AFM Unit 8 Homework 8 – 1 Central Tendency Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**I. Use the following information to answer questions 1 – 4. The following data represent the ages of the first 15 people in line for a PG-13 movie:**

25, 14, 51, 32, 27, 18, 4, 40, 35, 20, 43, 15, 22, 30, and 14.

1. Compute the mean, median and mode for the data and record your results. Show your work for mean, median.

|  |  |  |
| --- | --- | --- |
| Mean | Median | Mode |

1. The motion picture association changes the rating to NC-17, so no one under 17 is allowed in. Calculate the mean, median, and mode of the ages of the people who can go to the movie and compare your results to the results from question #1.

|  |  |  |  |
| --- | --- | --- | --- |
| Mean | Median | Mode | Comparison of results |

1. Now, both of the 14 year olds decided not to go see a movie, and the 4 year old exchanged his ticket with an 82 year old, and the 15 year old with a 60 year old. Recalculate the mean, median and mode again. Compare your results to the results from questions #1 and #2.

|  |  |  |  |
| --- | --- | --- | --- |
| Mean | Median | Mode | Comparison of results from #1 and #2 |

1. Which measure of central tendency (mean, median, or mode) is most affected by extreme values? Explain.

|  |  |
| --- | --- |
| Choose: mean, median, mode | Explanation: |

**II. Using any set of data, think about these questions and answer in complete sentences. Give examples to support your answer.**

1. Quite often the general public uses the word, “average” to represent either the mean or the median. If you were asked to report the “average of” a set of data, are there times when you would choose the mean or the median over the other? Give examples to defend your position.
2. Is the mean of a group of numbers always, sometimes or never a number in the group? Explain and give example.

**Always/Sometimes/Never (circle one) Explain: Example:**

1. Is the median of a group of numbers always, sometimes or never a number in the group? Explain and give example.

**Always/Sometimes/Never (circle one) Explain: Example:**

1. Is the mode of a group of numbers always, sometimes or never a number in the group? Explain and give example.

**Always/Sometimes/Never (circle one) Explain: Example:**

1. Some of the midterm grades in AFM were 72, 85, 64, 52, 96, 84, 78, and 84. If I added 10 points to each score, what is the new mean? Did it change? Explain.

AFM Unit 8 Hwk 8 – 2 Central Tendency and Graphical Displays Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Use the following to answer questions 1 – 5.

The following shows the scores for each basketball game for the 2012 – 2013 season.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 46 | 68 | 32 | 44 | 79 | 37 | 63 | 44 | 58 | 57 | 61 | 47 | 76 | 64 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. Create a stem and leaf (key!) | 1. Create a frequency table  |  |  | | --- | --- | | Intervals | Frequency | | 1. Create a histogram (label!) |

1. Compare the above with the 2011 – 2012 season below. Create a back to back stem-&-leaf and double histogram.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 65 | 68 | 72 | 60 | 75 | 55 | 63 | 61 | 58 | 57 | 61 | 77 | 76 | 64 |

|  |  |
| --- | --- |
| 1. Create a stem and leaf (key!) | 1. Create a histogram (label!) |

1. Compare the mean and median for the two seasons.
2. Using salary information from the Wacky Widget Company, answer the questions below.

|  |  |  |
| --- | --- | --- |
| Job | **Annual Salary** | **Number of Employees** |
| President | $150,000 - $200,000 | 1 |
| Vice President | $50,000 - $100,000 | 1 |
| Supervisor | $30,000 - $35,000 | 2 |
| Sales Representative | $25,000 – 30,000 | 2 |
| Warehouse Worker | $20,000 - $25,000 | 4 |
| Custodian | $15,000 - $20,000 | 4 |
| Clerical Worker | $10,000 - $15,000 | 3 |

1. Find the mean salary.
2. Find the median salary.
3. Which measure of central tendency best describes a typical wage at this company? Explain.
4. Why do you suppose most employees were upset by a recent newspaper headline reporting “Average worker at Wacky Widget making $45,000?
5. Create a newspaper headline that you feel is more appropriate.
6. Three statistics classes all took the same test. Histograms of the scores for each class are shown below.

1. How many students scored at least an 80 in each class?
2. What is the mean for each class?
3. Which class had the highest mean score?
4. Which 10-point interval contains the mean score for each class?
5. Which class had the highest median score?
6. For which classes are the mean and median most different? Which is higher? Why?
7. Which class did better on the test overall? Explain.
8. In non-mathematical terms, describe the shape of *each* graph.
9. Does there appear to be any gaps or outliers (extreme values) in any of the classes? If so, which ones? Explain.

**Box & Whisker Worksheet**

I. For questions 1 – 6, refer to the box & whisker graph below which shows the test results of a math class.

**Test Scores (as %) for 4th Period**

38 72 88 96 10

1. What was the high score on the test?
2. What percent of the class scored above a 72?
3. What was the median score on the test?
4. What percent of the class scored between 88 & 96?
5. Do you think that this test was too hard for the students? Explain.
6. Would you expect the mean to be above or below the median? Explain.
7. What would the test score have to be to be considered an outlier?

II. For questions 1 – 7, refer to the box & whisker graphs below that compare homework time per night with TV time per night for the same group of sophomores.

**TV & Homework Minutes per Night**

Homework Time

0 20 48 60 190

TV Time

0 15 60 110 225

1. What percent of the sophomores spend more than 60 minutes on homework per night?
2. If there were 800 sophomores, how many students spent more than 60 minutes on homework per night?
3. What percent of the sophomores spend less than 20 minutes per night on homework?
4. Would you expect the mean number of minutes per night to be higher or lower than the median? Explain.
5. Notice on the box and whisker plot for time spent on homework that the whisker from 48 to 60 is much

smaller than the whisker from 20 to 48. Explain what this tells you about the data.

1. What percent of the sophomores watch TV for at least 15 minutes per night?
2. Is it more common for a sophomore at this high school to spend more than 1 hour on homework

or more than 1 hour watching TV? Explain.

III. Mrs. Light just gave her last math test of the month. These are the scores:

* 1st Period: 97, 99, 81, 78, 73, 95, 33, 97, 64, 100, 85, 83, 85, 88, 79, 81, 93, 86, 83, and 71.
* 2nd Period: 61, 73, 76, 83, 71, 69, 78, 95, 73, 95, 90, 74, 87, 73, 85, 63, 68, 71, 88, and 87.

1. Construct a parallel box and whisker plot to compare the two classes.
2. What are the mean, median, and mode of the data for each class period?
3. Describe the distribution of the data (spread, gaps, outliers and shape of graph).
4. Are there any outliers? If so, what are they? What would the scores have to be to be considered an outlier?
5. If Mrs. Light decides to give everyone in 2nd period a 5 point curve, how, if at all, would this affect the five number summary?
6. Come up with two data sets that each have 5 elements, each have a mean & a median of 9, but

whose box & whisker graphs would be dramatically different.

AFM Unit 8: Standard Deviation Homework 8 – 4 Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

DO ALL YOUR WORK ON ANOTHER SHEET OF PAPER! ANSWER EVERY PART!!!

1. Given the following numbers, SHOW ALL THE STEPS to find the standard deviation:

45, 65, 145, 85, 25, 25

1. The monthly incomes of 10,000 workers in Gahanna are distributed normally. Suppose the mean monthly income is $1250 and the standard deviation is $250.

a) How many workers earn more than $1500 per month?

b) How many workers earn less than $750 per month?

c) What percentage of the 10,000 workers earn between $500 and $1750 per month?

d) What percentage of the workers earn less than $1750 a month?

1. You are filling out an application for college. The application requests either your ACT or SAT Math score. You

scored 26 on the ACT composite and 650 on the SAT Math. On the ACT exam, the composite mean score is 21 with a standard deviation of 5, while the SAT Math has a mean score of 514 with a standard deviation of 113. Which test should you provide on the application? Explain your reasoning.

1. Sales: The following table gives the price of men’s and women’s jeans. Compare by answering the questions below.

|  |  |  |  |
| --- | --- | --- | --- |
| Men’s | Price | Women’s | Price |
| Wrangler | $49 | Sear’s That Fit | $48 |
| Express | $69 | Gap Straight Leg | $69 |
| Levi’s 509 | $54 | American Eagle | $49 |
| Gap | $59 | Silver Bullet | $89 |
| Abercrombie | $70 | Miss Me | $99 |

a) Find the mean and standard deviation of the prices of the men’s jeans.  
b) Find the mean and standard deviation of the prices of the women’s jeans.

c) Which had the greatest variation in price?

d) Suppose during end-of-year clearance sales, the stores lower the prices of all women’s jeans by $10. How will the new standard deviation compare with the original standard deviation? Why do you think this occurs?

1. Can the standard deviation every equal 0? Explain.
2. The table shows the resulting scores of the final exam in history for students at Madrid High School.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Scores | 54-61 | 61-68 | 68-75 | 75-82 | 82-89 | 89-96 |
| Frequency | 3 | 7 | 11 | 38 | 19 | 12 |

a) How many students took the History Final Exam?

b) Find the mean and standard deviation.

c) If the frequency of each data item is doubled, what the effect on the mean and standard deviation? Explain.

AFM Unit 8: Hwk 8 – 5 Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Put your work on another sheet of paper.

1. The following numbers represent the gold medals won by different countries in the Olympics.

38, 34, 21, 22, 6, 12, 5, 5, 9, 7, 8, 3, 5, 6, 5, 6, 7, 6, 7, 4

1. Create a box and whisker plot for the given information.
2. 25% of the data falls above what number?
3. How many medals would a country have to win to be considered an outlier? Are there any outliers?
4. Find the three measures of central tendency. Which best represents this data? Explain why.
5. Explain the distribution of the data (shape, spread, gaps, outliers)
6. Find the standard deviation of the data.
7. How many items in the data set fall within one standard deviation of the mean? Two standard deviations?
8. If the country won 19 medals, they would be within \_\_\_\_\_ standard deviations of the mean?
9. 68% of the data falls within winning how many gold medals?
10. The top 2.5% won how many gold medals?

|  |  |
| --- | --- |
| RBI | Frequency |
| 70-90 | 2 |
| 90-110 | 11 |
| 110-130 | 39 |
| 130-150 | 17 |
| 150-170 | 9 |
| 170-190 | 7 |

1. The table shows the frequency of runs batted in (RBI) by the American League batting leaders between 1907 and 1991.
2. How many RBI’s ranged from 70 – 190?
3. Find the mean, median and mode from the frequency table.

(Hint: Be sure to use the middle number of the interval for

calculations)

1. Find the standard deviation.
2. If the frequency of each item is doubled, what is the affect on the

mean and standard deviation.

1. The cost of groceries when parents go shopping is normally distributed. Of the 280 different parents’ visits this year, the mean amount of money they spent was $196 with a standard deviation of $12.
2. Make the curve to represent the normal distribution and label it.
3. Find the amount of money spent on groceries that were within 1 standard deviation from the mean.
4. Of the parents surveyed, how many spent more than $220?
5. What percentage of the parents spent less than $184?

AFM Unit 8 Study Guide Hwk 8 - 7 Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

I. The Laboratory of Ornithology holds an annual Christmas Bird Count, in which birdwatchers at various locations around the country see how many different species of birds they can spot. Here are some of the counts reported from sites in Texas during the 1999 event.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 228 | 178 | 186 | 162 | 206 | 166 | 163 | 183 | 181 | 206 | 177 |
| 175 | 167 | 162 | 160 | 160 | 157 | 156 | 153 | 153 | 152 |  |

1. Create a stem and leaf display of these data.
2. Create a histogram of this data.
3. Find the 5 number summary.
4. State the IQR. What does this information tell you about the number of birds sighted?
5. Write a brief description of the distribution of the data.
6. Considering the data collected, what count would be considered an outlier? Are there any outliers? If we took the outlier out, how would this affect our five number summary?
7. Calculate the mean, median and mode. Which central tendency best represents the data? Explain.
8. If each person said they counted one less than they had previously stated, how would this affect the mean, five number summary, and standard deviation (if at all)?
9. Calculate the standard deviation. 225 is w/in how many standard deviations from the mean? 163 is w/in how many standard deviations from the mean?
10. 68% of the data falls between \_\_\_\_\_\_\_\_\_\_, 95% of the data falls between \_\_\_\_\_\_\_\_\_\_, and 99% of the data falls between \_\_\_\_\_\_\_\_\_\_.
11. The percentage that spotted over 232 birds is?

II. A grading scale is set up for 1000 students’ test scores. It is assumed that the scores are normally distributed with a mean score of 75 and a standard deviation of 15.

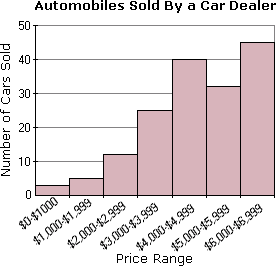
1. Construct a normal distribution curve.
2. How many students will have scores between 45 and 75?
3. If 60 is the lowest passing score, how many students are expected to pass the test?

III. Given the frequency table, find the following:

|  |  |
| --- | --- |
| Score | #Students |
| 60-70 | 2 |
| 70-80 | 8 |
| 80-90 | 11 |
| 90-100 | 6 |

1. The mean, median, mode, and total number of students in the class.
2. If the teacher decided to give everyone a 5 point curve, how would that affect the mean and standard deviation (if at all)?
3. If a student made up a test and made a 62, how would that affect the five number summary?

IV. Histograms



1. How many automobiles were sold by the car dealer?
2. What is the shape of the histogram?
3. Find the intervals in which the mean, median and mode would be found.

V. Explanation problems.

1. When comparing data, how would you know which collection had more variation among its data?
2. Look back over ALL the homework problems and your quizzes!