Math 13 - Practice Test 1

Name: _____ **Class Number:** _____

1) A survey of senior students in high school asked the questions listed below. For each variable indicate the scale or level of measurement (e.g. ratio, interval, ordinal, nominal) :

a. Do you drink coffee? (no, yes). **Nominal**
b. Neighborhood location (1=north, 2=south, 3=east, 4=west). **Nominal**
c. Favorite food style (italian, french, mexican, indian, other). **Nominal**
d. Can you play a musical instrument? (not at all, a little, pretty well). **Ordinal**
e. Last 4 digits of social security number. **Nominal**
f. Birthdate year (e.g. 1998, 1999). **Interval**
g. Weight (in ounces). **Ratio**
h. Number of pets (e.g. 0, 1, 2,), **Ratio**

2) True or False, and explain why

a. If you add 7 to each entry on a list (of numbers), that adds to the average. **True**
b. If you add 7 to each entry on a list, that adds to the standard deviation. **False**
c. If you double each entry on a list, that doubles the average **True**
d. If you double each entry on a list, that doubles the standard deviation. **True**
e. If you change the sign of each entry on a list, that changes the sign of the average. **True**
f. If you change the sign of each entry on a list, that changes the sign of the standard deviation. **False**

3) Consider a data set with at least three data values. Suppose the highest value is increased by 10 and the lowest is decreased by 10.

a. Does the mean change? Explain. **No; adding 10 and subtracting 10 cancel out**
b. Does the median change? Explain **No, the median remains unchanged when values at the end of the distribution change**
c. Is it possible for the mode to change? Explain. **Yes, depending on the existing values**

4) Which of the following statements are true? Explain or give examples.

a. The median and the average of any list of numbers are always close together. **False. The median and the average are not close together in skewed distributions**
b. Half of a list of numbers is always below average. **False. Half of a list is always below the median, not the average**
c. If two sets of numbers have exactly the same average of 50 and the same standard deviation of 10, then the percentage of entries between 40 and 60 must be exactly the same for both lists. **False**

5) The following data are taken from a study conducted by the National Park System, of which Death Valley is a unit. The ground temperatures (in Fahrenheit degrees) were taken from May to November in the vicinity of Furnace Creek. Find the mean, median, and mode.

```
[1] 146 152 168 174 180 178 179 180 178 178 168 165 152 144
```

The mean = 167.2857143; the median = 171, and the mode is 178.

6) At General Hospital, nurses are given performance evaluations on a scale of 1 to 10 (10 being the highest rating) for several activities: promptness, record keeping, appearance, and bedside manner with patients. The average rating is determined by giving the following weights:

- 20% for promptness
- 25% for record keeping
- 15% for appearance
- 40% for bedside manner with patients

What is the average rating for a nurse with ratings of 9 for promptness, 7 for record keeping, 6 for appearance, and 10 for bedside manner?

Average rating is: 8.45

7) A data set has continuous values ranging from a low 10 to a high 52. What's wrong with using the class limits: 10-19, 20-29, 30-39, 40-49 for a frequency table?

The class limits do not include values between: 19 and 20, 29 and 30, and 39 and 40

8) A person's metabolic rate is the rate at which the body consumes energy. Here are the metabolic rates of 77 men who took part in a study of dieting: 1792, 1666, 1362, 1614, 1460, 1867, 1439 (The units are calories per 24 hours.)

Calculate the mean and standard deviation of the metabolic rates, showing each step in detail. First find the mean $\bar{x}$. Then find each of the deviations from the mean $x_i - \bar{x}$, and their squares $(x_i - \bar{x})^2$. Finally, add all the squared deviations and divide them by $n - 1$. Write down all the computing steps.

mean = 1600

standard deviation = 189.2397069

9) What percent of the observations in a distribution lie between the first quartile and the third quartile?

a. 25% **No**
b. 50% **Yes**
c. 75% **No**

10) Can the Standard Deviation ever be negative?

No.

11) The Governor of California proposes to give all state employees a raise:

a. One option is to give a flat raise of $250 a month. What would this do to the average monthly salary of state employees? to the Stadandrd Deviation? **This would increase the average by $250 but leave the SD alone.**
b. Another option is a raise of a 5% increase in the monthly salaries. What would this do to the average and SD? **This would increase the average and SD by 5%.**

12) A data set with whole numbers (i.e. integers) has a minimum value of 20 and a maximum value 82. Determine 7 classes, with their corresponding class widths, and class limits, by using equal-size widths.

```
      lower     upper
1  20.00000  28.85714
2  28.85714  37.71429
3  37.71429  46.57143
4  46.57143  55.42857
5  55.42857  64.28571
6  64.28571  73.14286
7  73.14286  82.00000
```

13) A study on college students found that the men had an average weight of about 66kg and an SD of about 9kg. The women had an average weight of about 55kg and an SD of 9kg.

a. Find the averages and SDs, in pounds (1kg = 2.2lb) **avg men = 145.2lb, SD men = 19.8; avg women = 121, SD women = 19.8**
b. If you took the men and women together, would the SD of their weights be smaller than 9kg, just about 9kg, or bigger than 9kg? Why? **Bigger than 9kg, because there is a larger spread, roughly from 56kg (55kg - 9kg) to 75 kg (66kg + 9kg)**

14) The following data give the total number of fires in Ontario, Canada, in the months of 2002:

```
 [1]  6 13  5  7  7  3  7  2  5  6  9  8
```

Calculate the following summaries:

- Minimum **2**
- Maximum **13**
- Range **11**
- Q_1 (25th percentile) **5**
- Q_2 (50th percentile) **6.5**
- Q_3 (75th percentile) **7.5**
- Mode **7**
- Mean **6.5**
- Variance **8.0909091**
- Standard Deviation **2.8444523**

15) With the results obtained in the previous question, make a box plot of the data.