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excellent

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Math 123 Exam 1

SHOW ALL WORK

Name _____

1. Suppose that a survey of 1200 AHC students found that 67% of them drive to school. Identify that sample and the implied population.

Sample: 1200 AHC students

Population: All AHC students

2. Suppose that a census found that 81% of all American adults have a TV in their bedroom. Is this a *statistic* or a *parameter*? Explain.

This is a parameter because the data is taken for the population of all American adults.

3. Identify the level of measurement for your GPA here at AHC.

3 0
AST
ordinal - can be ranked
ratio subtraction makes no sense
natural zero ratio: $\frac{4.0}{2.0} = 2$

4. Identify the level of measurement for the year in which you started attending AHC.

interval - can be ranked
subtraction makes sense
no true zero

5. To take a random sample of students at AHC, you get an alphabetized list of students, then take every 100th name from the list. Identify the sampling technique used.

Systematic sampling technique

$$\text{Class Width} = \frac{78-12}{5} = \frac{66}{5} = 13.2 \Rightarrow \boxed{14 \text{ class width}}$$

6. The following data gives the number of people served at a restaurant over the last 24 days:

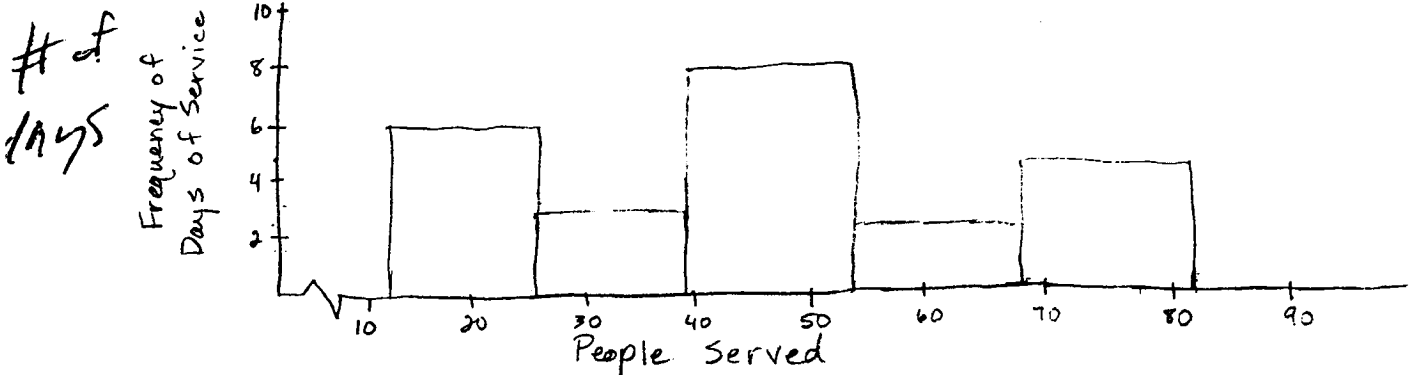
21 36 19 12 73 18 18 75 67 56 68 53
 42 40 41 27 24 53 49 73 29 49 51 78

a. Build a frequency distribution table using five classes. You must include class limits, class boundaries and frequencies, but NOT midpoints or cumulative frequencies.

Class	Lower Limit	Upper Limit	Lower Bound	Upper Bound	Frequency
1	12	25	11.5	25.5	6
2	26	39	25.5	39.5	3
3	40	53	39.5	53.5	8
4	54	67	53.5	67.5	2
5	68	81	67.5	81.5	5
					24

b. Use your table to build a frequency histogram. Be sure to label clearly. DO NOT label the vertical axis as "frequency." Be more specific. DO NOT use midpoints.

Number of People Served at Restaurant - 24 days



c. Write a sentence that explains the meaning of the second bar of your histogram. Your response should include the words "people" and "days."

The second bar represents that between 26 and 39 people came to this restaurant on 3 days of the 24 days that were recorded.

$$IQR = 640 - 370 = 270$$

$$\text{Outlier} = Q_1 - 1.5(IQR) = 370 - 1.5(270) = -35$$

$$Q_3 + 1.5(IQR) = 640 + 1.5(270) = 1045$$

7. Find the median and mode of the data given in the stemplot, identify any outliers and describe the shape of the distribution.

Key: ~~4/21~~ ~~4210~~ $4|2 = 420$

Mode: 420

Outlier(s): 890 looks like a possible outlier but using the formula it is not

Shape: Skewed left or negative

Median: 505

1/7

2/01

3/457

4/2224

5/01578

6/046689

7/

8/9

$$\frac{500 + 510}{2} = \frac{1010}{2} = 505$$

8. Use the weighted mean formula to find the GPA for someone who got an A in a 3 unit class, a B in a 5 unit class and a C in a 4 unit class.

	$\frac{x}{w}$	$\frac{x \cdot w}{w}$
A	4.0	12.0

B	3.0	15.0
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C	2.0	8.0
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$$\sum w = 12 \quad \sum (x \cdot w) = 35.0$$

$$\frac{\sum (x \cdot w)}{\sum w} = \frac{35}{12}$$

$$= 2.92 \text{ GPA}$$

9. Find the sample standard deviation for this data: 4, 6, 7, 8, 9, 10. For credit, you must show your work using a table as in class.

x	$x - \bar{x}$	$(x - \bar{x})^2$
4	$4 - 7.3 = -3.3$	10.89
6	$6 - 7.3 = -1.3$	1.69
7	$7 - 7.3 = -.3$.09
8	$8 - 7.3 = .7$.49
9	$9 - 7.3 = 1.7$	2.89
10	$10 - 7.3 = 2.7$	7.29
		$\sum = 23.34$

$$\bar{x} = \frac{4 + 6 + \dots + 10}{6} = \frac{44}{6} = 7.3$$

$$S = \sqrt{\frac{\sum (x - \bar{x})^2}{n - 1}}$$

$$n = 6$$

$$= \sqrt{\frac{23.34}{5}} \approx 2.2 \text{ standard deviation}$$

10. Two groups of people were asked to compete in a 10 km running race. The first group consisted of a random sample of all AHC students, while the second group consisted of a random sample of only members of the AHC running team. Which group would you expect to have the larger standard deviation in their finish times? Explain.

I would expect the sample of all AHC students to have a larger standard deviation in their finish times because all students could include non-runners and runners. The times for runner could be low and the time for non-runners could be very high. So all AHC student times would be spread out much more, therefore, the standard deviation would be larger than the running team.

$$IQR = 10.15 - 9.25 = .9$$

$$9.25 - 1.5(.9) = 7.9$$

$$10.15 + 1.5(.9) = 11.5$$

11. A sample of the hourly pay rate of randomly chosen AHC student workers yielded the data below. Which measure of central tendency (i.e. "average") would be the best choice to describe the data? Explain.

9.25 9.50 25.20 9.25 10.15 9.75

I would say median would be the best measure of central tendency because 25.20 appears to be an outlier.

12. Is it possible to score only 10% on an exam and yet have your score be the 99th percentile? Explain very clearly, using the definition of percentile.

Being in the 99th percentile means 99% of the scores would be lower than yours. So if 99% scored 10% or lower then this could be true.

This would mean it was a very difficult test or the class did not learn what it was suppose to.

13. You scored 60 points on an exam for which the mean was 70 and the standard deviation was 5. Your friend scored 70 on an exam for which the mean was 82 and the standard deviation was 12. Who did better as compared to the rest of their class? Explain, using z-scores.

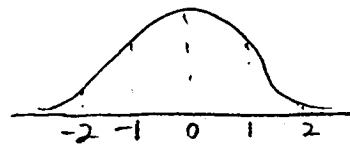
$$z = \frac{x - \bar{x}}{s}$$

$$z = \frac{60 - 70}{5} = \frac{-10}{5}$$

$$z = -2$$

$$z = \frac{70 - 82}{12} = \frac{-12}{12}$$

$$z = -1$$



The friend scored better because he is only 1 deviation from the mean where I am 2 deviations from the mean.

14. Suppose that weights of grizzly bears follow a bell-shaped distribution with mean 400 pounds and standard deviation 50 pounds. What percent of all grizzly bears would you expect to weigh between 250 and 400 pounds? Use the Empirical Rule.

$$\frac{99.7}{2} = \boxed{49.85\%}$$

