

Math 153 - Test 1

February 13, 2014

Name _____

Score _____

Show all work to receive full credit. Supply explanations where necessary. You may use your calculator for all statistical computations.

1. (2 points) Recent research indicates there is a strong correlation between the extinction of the woolly mammoths and the disappearance of a certain type of flower eaten by the mammoths. Does this suggest that mammoth extinction was caused by the flower disappearance? Explain.

2. (2 points) A survey conducted by LA Fitness asked members to report the amount of time they work out each day. What is wrong with such a survey? How could the data collection be improved?

3. (2 points) After stopping him for speeding, the state trooper told John that his speed was 93.18935 mph. Is this number an example of too much accuracy or too much precision? Explain.

4. (2 points) What is wrong with the following pair of survey questions?
 - Are you aware of the research that suggests that people with higher IQ scores wash their cars more often?
 - How often do you wash your car?

5. (2 points) Evidence suggests that flossing your teeth regularly can add 6 months to your life expectancy. Is this result statistically significant or practically significant?

6. (10 points) What type of sampling is described in each situation. Choose from random, systematic, convenience, stratified, or cluster.

(a) The first ten people to enter a store are asked about their shopping preferences.

(b) One hundred business cards are placed into a box. The cards are mixed up and five are selected.

(c) PSC students are divided into groups according to age, and ten people are selected at random from each group.

(d) Every third problem in a textbook's exercise set is selected for homework.

(e) Ten Illinois community colleges are selected at random to take part in a survey. All students at those colleges are asked to participate.

7. (6 points) Determine whether the data are discrete or continuous.
- (a) The body temperatures of humans
 - (b) The numbers of wheels on vehicles on interstate I-80
 - (c) The numbers of pages of newspapers
 - (d) The weights of newspapers
8. (2 points) What is the difference between an experiment and an observational study?
9. (6 points) Determine the level of measurement. Choose from nominal, ordinal, interval, or ratio.
- (a) Years in which winter olympics were held
 - (b) Colors of Starburst fruit chews
 - (c) Weights of Starburst fruit chews
 - (d) Movie ratings on a scale of 5 stars

10. (5 points) The prices for a gallon of gasoline have mean \$3.48 and standard deviation \$0.18. What are the cut-offs for unusually low and high gas prices?
11. (5 points) For each of the following situations, tell which type of graph would best display the data. Choose from *dot plot*, *bar graph*, *time-series graph*, *scatterplot*, *pie chart*, *ogive*, *histogram*, or *stem-and-leaf plot*. You may get partial credit if you offer brief explanations.
- (a) Biologists caught, weighed, and released 350 fish. They want to make a graph showing the numbers of fish in the different weight classes.
 - (b) A couple wants to sketch a graph showing how they budget their monthly earnings. They'd like to show how their money is divided among 7 different categories.
 - (c) A teacher graded 25 tests, and they all had scores that were whole numbers between 17 and 55. She wants to display the entire set of scores.
 - (d) Among other things, Pike's dairy sells ice cream, milk, butter, and cheese. A manager would like to show a graph displaying monthly sales of these products.
 - (e) Oscar randomly selected 100 women. For each woman, he recorded her age and the number of minutes each day that she read. He formed ordered pairs and plotted the data.

12. (14 points) In the following stem-and-leaf plot, $4|5$ means 45.

3		1	4				
4		1	2	5			
5		0	0	2	6	7	8
6		3	8	8			
7		0					

(a) Are the data values shown above approximately normally distributed? Briefly explain.

(b) Compute the mean, median, and mode(s).

(c) Compute the range.

(d) Without actually computing it, find a reasonable approximation for the standard deviation. Explain.

(e) Briefly explain how the values of the mean and median support your conclusion in part (a).

13. (2 points) What is the difference between a statistic and a parameter?

14. (6 points) Listed below are amounts spent by candidates in running campaigns for local county board seats.

\$45,263 \$39,875 \$29,500 \$53,276 \$79,034 \$55,611

Based on these numbers, would it be unusual for a candidate to spend \$80,000? What about \$15,000?

15. (5 points) Some teens and adults were asked how much cash they were carrying. 15 teens were carrying a mean amount of \$9.75, and 25 adults were carrying a mean amount of \$28.15. What was the mean amount carried by all 40 people?

16. (14 points) Normal body temperatures (taken orally) for children of ages 3–10 range from 95.9°F to 99.4°F . The frequency distribution shown below gives the temperatures of some children in a random sample.

Temperature ($^{\circ}\text{F}$)	Frequency
95.9–96.4	2
96.5–97.0	5
97.1–97.6	4
97.7–98.2	8
98.3–98.8	19
98.9–99.4	8

- (a) What are the class boundaries associated with the last class listed above?
- (b) What is the class width?
- (c) What are the class midpoints?
- (d) Use class midpoints to estimate the mean temperature.
- (e) Use class midpoints to estimate the median.
- (f) Do the temperatures appear to be normally distributed? Explain.

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17. (15 points) Refer to the ammonium ion concentration data on the attached sheet.

(a) Construct a frequency distribution for the data. Use at least five classes.

(b) On graph paper, construct the corresponding relative frequency histogram. Use class boundaries to label your horizontal axis.

Concentration of Ammonium Ions in 50 Samples

(In Percentages)

1.4	2.3	2.4	2.6	2.6	2.7	2.7	2.8	2.8	2.9
2.9	2.9	3.0	3.1	3.1	3.2	3.3	3.4	3.5	3.5
3.6	3.7	3.7	3.9	3.9	4.0	4.0	4.1	4.1	4.2
4.2	4.2	4.4	4.5	4.6	4.6	4.6	4.7	4.8	4.8
4.8	4.9	5.2	5.2	5.5	5.6	5.7	6.5	6.8	7.6