Math 153 - Test 1

February 11, 2016

Name _____

Score _____

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

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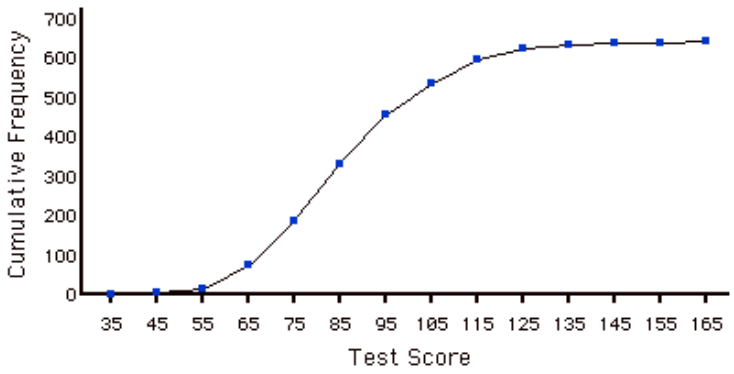
1. (12 points) The following graph summarizes the scores on a widely administered test.



   (a) What is the name of this type of graph?

   (b) About how many test scores are in the sample?

   (c) Which interval along the horizontal axis contains the most test scores? Explain how you know.

   (d) Assuming that the numbers along the horizontal axis are class midpoints, estimate the number of test scores between 100 and 110.

   (e) Are the test scores approximately normally distributed? Explain. (Hint: Think about the corresponding histogram.)

2. (12 points) A data set contains decimal numbers between 1.7 and 40.1. Each number in the data set has exactly one digit to the right of the decimal point. Katrina constructs a frequency distribution whose lowest class limit is 1.4 and whose class width is 8.1.

   (a) How many classes are there in Katrina's frequency distribution?

   (b) List all the lower class limits (starting with 1.4).

   (c) List all the upper class limits.

   (d) Determine the boundaries (on both sides) of the first class.

   (e) Make up some frequencies for each of the classes you found above so that your frequency distribution shows data that are skewed left.

3. (3 points) In the years following the end of World War II, it was found that there was a strong correlation between the number of human births and the world's stork population. Can we conclude storks cause babies? Explain your reasoning.

4. (7 points) Organize the following data into a stem-and-leaf plot. Then determine the mean, median, and mode.

47	32	48	51	10	27	50	21	24	12
21	32	48	12	28	32	36	37	38	49

5. (3 points) PSC students were asked by email to participate in a survey regarding student involvement. Several hundred students participated. Do you think the sampling method is flawed? Explain.

6. (6 points) Determine the level of measurement. Choose from *nominal*, *ordinal*, *interval*, or *ratio*.

   (a) Rankings of National Football League quarterbacks

   (b) Amount of time (in minutes) spent studying

   (c) Illinois automobile license plate numbers

   (d) Years in which AT&T chief executive officers retired

7. (6 points) A professor separated her students' lab reports into two piles—those of the passing students and those of the failing students. Twenty students passed, and their average score was 82.5. Eight students failed, and their average score was 62.2. What was the average score of all the students?

8. (5 points) Determine whether the given value is a statistic or a parameter.

   (a) There are 58 national parks in the National Park Service.

   (b) Among the students who volunteered to take the CCSSE survey, 47% were full-time students.

   (c) The mean atomic weight of all elements in the periodic table is 134.355 atomic mass units.

9. (3 points) Determine whether each value comes from a discrete collection or a continuous collection of data.

   (a) Sam owns 210 video games.

   (b) One of the dogs at the animal shelter weighs 210 lbs.

10. (12 points) The frequency distribution shown below gives the salaries (in thousands of dollars) of the employees at a small company.

Salary (thousands of $)	Frequency
12.8–32.1	13
32.2–51.5	8
51.6–70.9	4
71.0–90.3	1
90.4–109.7	1

(a) Describe the distribution of salaries.

(b) Based on your answer from above, which do you expect to be greater, the mean or the median? Why?

(c) What are the class midpoints?

(d) Use class midpoints to estimate the mean salary.

(e) Use class midpoints to estimate the median.

11. (10 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) A CEO wants to sketch a graph showing how the company budget is split up among 10 different categories.

    (b) A teacher graded 20 tests, and they all had scores that were whole numbers between 15 and 60. He wants to display the entire set of scores.

    (c) Biologists caught, weighed, and released 500 fish. They want to make a graph showing the numbers of fish in the different weight classes.

    (d) Among other things, Pike's dairy sells ice cream, milk, butter, yogurt, and cheese. A manager would like to show a graph displaying last year's total sales of these products.

    (e) Craig 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. (10 points) What type of sampling is described in each situation. Choose from *random*, *systematic*, *convenience*, *stratified*, or *cluster*. You may get partial credit if you offer brief explanations.

(a) Fifteen midwestern universities are selected at random to take part in a survey. All students at those universities participate in the survey.

(b) Every fourth student is selected to participate in a survey.

(c) The first eight people to walk through the door are given a free gift card.

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

(e) Students are divided into groups according to age, and twenty people are selected at random from each group.

13. (4 points) What is the difference between an experiment and an observational study.

14. (3 points) What is the name of this type of graphical display? Be specific.

15. (4 points) A convenience sample of 5 students is selected. Explain why this is not a simple random sample.