Name: _____

Math 203: Contemporary Mathematics

Chapter 9 test, version (a)

Thursday, March 11, 2009

60 points

Instructions:

1. This test has 4 pages (including this one), which contain 4 questions. Please check that you have all of the pages.
2. Read each question carefully. If you have any questions, please ask.
3. Answer all of the following questions clearly and completely. Justify all of your answers. Most of the points you receive will be based on the accuracy, completeness, and clarity of your responses. Use full sentences, and avoid saying things that are untrue, ambiguous, or nonsensical.
4. You may use a calculator for this test, but you may not use a book or any notes.
5. Give your answer to each question completely and clearly in the space provided. You may use the back of the test pages for scratch work; however, if you want this work to be considered, please make note of it in the space provided for the question.
6. Erase or cross out work you do not wish to be graded.
7. You have 25 minutes to complete this test. Good luck!

Here are some formulas if you need them.

Sample variance

Given a sample of n measurements x_1, x_2, ..., x_n with mean $\bar{x}$, the **sample variance**, s^2, is

$$s^2 = \frac{(x_1 - \bar{x})^2 + (x_2 - \bar{x})^2 + \cdots + (x_n - \bar{x})^2}{n-1}.$$

Sample standard deviation

Given a sample of n measurements x_1, x_2, ..., x_n with mean $\bar{x}$, the **sample standard deviation**, s, is

$$s = \sqrt{s^2} = \sqrt{\frac{(x_1 - \bar{x})^2 + (x_2 - \bar{x})^2 + \cdots + (x_n - \bar{x})^2}{n-1}}.$$

Population variance and population standard deviation

Suppose the set of all N measurements, x_1, x_2, ..., x_N, on a population of N elements is given. If the population mean is μ, then the **population variance**, σ^2, is

$$\sigma^2 = \frac{(x_1 - \mu)^2 + (x_2 - \mu)^2 + \cdots + (x_N - \mu)^2}{N}$$

and the **population standard deviation**, σ, is

$$\sigma = \sqrt{\sigma^2} = \sqrt{\frac{(x_1 - \mu)^2 + (x_2 - \mu)^2 + \cdots + (x_N - \mu)^2}{N}}.$$

Question 1. (16 points.) The city council would like to determine how local voters feel about eliminating metered parking downtown. A survey is taken of adults who are shopping downtown on one afternoon.

(a) (4 points.) What is the population in this case?

(b) (4 points.) What is the sample?

(c) (4 points.) What is the variable of interest?

(d) (4 points.) What sources of bias might there be in this sampling procedure?

Question 2. (6 points.) What is the difference between *sample mean* and *population mean*? How are they related? Be as clear, as precise, and as complete in your answer as you can.

Question 3. (18 points.) Here are 60 random digits I generated by rolling 10-sided dice:

389075 965868 188078 894288 759602 446678 974204 799108 600988 248302

The current members of the Board of Regents of the University of Nebraska are listed below.

1. Timothy Clare
2. Howard Hawks
3. Chuck Hassebrook
4. Bob Whitehouse
5. Jim McClurg
6. Kent Schroeder
7. Bob Phares
8. Randolph Ferlic
9. Tim Hruza
10. Emily Zimmer
11. Brad Bohn
12. Neal Bonacci

You are interested in the regents' opinions on a certain issue, but you don't have the resources to survey all of them, so you can only survey a sample.

(a) (6 points.) Use the random digits above to select a **simple random sample** of size 3 from the list of regents. Explain what you are doing.

(b) (6 points.) Use the random digits above to select a **30% independent sample** from the list of regents. Explain what you are doing.

(c) (6 points.) Use the random digits above to select a **1-in-4 systematic sample** from the list of regents. Explain what you are doing.

Question 4. (20 points.) The following table shows the 20 largest cities in Nebraska and their populations.

1. Omaha	424,482	6. Fremont	25,353	11. Columbus	21,399	16. Lexington	10,155
2. Lincoln	248,744	7. Hastings	25,343	12. La Vista	16,411	17. Elkhorn	8,439
3. Bellevue	48,391	8. North Platte	24,079	13. Scottsbluff	14,692	18. Alliance	8,064
4. Grand Island	44,802	9. Norfolk	23,146	14. Beatrice	12,873	19. York	7,904
5. Kearney	30,129	10. Papillion	22,222	15. South Sioux City	12,001	20. Blair	7,870

Source: United States Census Bureau (2007 estimates)

(a) (4 points.) Find the mean of this data.

(b) (4 points.) Find the median of this data.

(c) (6 points.) Give the five-number summary of this data.

(d) (6 points.) Construct a box-and-whisker plot for this data.

Name: _____

Math 203: Contemporary Mathematics

Chapter 9 test, version (b)

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