Math 160 - Fall 2004
G. C. Neumann
11:30 MWF

Midterm #3
November 19, 2004

Name: _____

PLEASE READ THIS PAGE!!!

1. **Hints:**
   - You might want to quickly look over all of the questions and start by working the questions that are easiest for you.
   - Check your answers only if you have time.
   - Many of the questions have multiple parts. Don't automatically give up on a question because you don't know how to do one part.
   - Consider showing your work, even when it's not requested. This could help you earn partial credit for an incorrect answer.
   - You don't get extra points for finishing early. If you have extra time, please consider checking your work over one more time before turning in your paper.
2. **Reminders:**
   - You may use a calculator, provided that your calculator cannot be used to communicate with others (for example, no cell phones are allowed).
   - You are allowed to use the sheet of notes that you prepared for use with this exam (both sides of one $4'' \times 6''$ note card with handwritten notes). These notes must be turned in with your exam. No other type of written materials is allowed.
3. Read the following statement and sign your name:

   On my honor, as a student, I have neither given nor received unauthorized aid on this academic work.

   Signature: _____
4. Please make sure that your exam contains *six pages*, including this one.

Question	Score	Possible	Question	Score	Possible
1		10	4		10
2		10	5		15
3		40	6		15
			Total		100

1. (2 points each) Circle either "True" or "False" for each of the following:

   a) True False: Suppose that one of the variables in your data set is reaction time. Reaction time is measured in seconds. The mean, median, and standard deviation of reaction time will all be given in seconds.

   b) True False: The sum of the deviations of a set of observations should be zero, provided that we don't round the mean.

   c) True False: We survey a sample of people randomly chosen from a large population. Suppose that 43% of our sample answered "Yes" to the survey's "Yes / No" question. Also suppose that our survey has a margin of error of $\pm 3\%$ for 95% confidence. Then there is at most a 5% chance that our sample's result (43%) is more than ± 3 percentage points away from the percentage of the entire population that would answer "Yes."

   c) True False: Confounding is increased by randomly assigning subjects to the control and treatment groups in an experiment.

   d) True False: You roll a fair, six-sided die. There will always be exactly ten rolls where a three is rolled in any sixty rolls of this die.

2. (5 points each) A jar of jelly beans has 10 licorice-flavored jelly beans, 20 orange-flavored jelly beans, and 20 lemon-flavored jelly beans. You have shaken the jar and taken a jelly bean. It's a lemon-flavored jelly bean and you don't like this flavor.

   (a) You put the lemon-flavored jelly bean back in the jar. You shake the jar and draw a jelly bean. What is the probability that you've drawn a lemon-flavored jelly bean? Show your work.

   (b) Instead of putting the jelly bean back in the jar, you put it in your pocket. You shake the jar and draw a jelly bean. What is the probability that you've drawn a lemon-flavored jelly bean? Show your work.

3. Consider the following scores on a third grade reading test:

$$98, 73, 82, 67, 84, 89, 68, 87, 40, 93$$

Show your work for all calculations.

(a) (5 points) Make a stemplot summarizing this data.

(b) (10 points) Which scores (if any) are outliers? What does this tell you about how the mean (or average) score and median score should compare?

(c) (10 points) Find the median score, Q_1, and Q_3. This should be done by hand (rather than having your calculator do it for you).

(d) (5 points) Calculate the mean score on this reading test. If you are entering the scores and pressing the "average" button on your calculator, also write an expression for how you would calculate the mean by hand.

(e) (10 points) Suppose that these students also took a pretest. The five-number summary for the pretest is Min=20, Q_1=30, M=50, Q_3=75, Max=95. Draw a boxplot summarizing the results for the pretest and for the reading test. How do the two sets of results compare? Be specific.

4. (5 points each) Mrs. Mason teaches at a school that has a total of 327 students. This school just received twenty children's tickets for a concert. The principal has asked Mrs. Mason to choose which students get the tickets. Mrs. Mason decided to choose the students randomly by using a table of random digits.

   (a) Mrs. Mason has an alphabetical roster of all of the students at the school. How should she assign labels so that she can use a table of random digits to select which students receive the concert tickets? In particular, what label would the first child on the roster receive? What label would the last child on the roster receive?

(b) After discarding labels that didn't match any of the labels for her school's students, Mrs. Mason has read off the following twenty labels from a table of random digits:

123, 320, 179, 320, 005, 163, 230, 079, 087, 005,
323, 070, 273, 019, 001, 173, 003, 109, 154, 227

Based on this list of labels, will the first child on the roster be given a concert ticket? Is Mrs. Mason done reading labels from her table of random digits? Briefly explain your answers.

5. Suppose that you ask 3200 registered voters the following question:

Are you in favor of increasing taxes to pay for an after-school arts program?

All 3200 voters answered your question and 1072 of these voters answered "Yes."

(a) (10 points) The people you asked were selected randomly from all of the registered voters in Chicago. Write a press release summarizing your result about Chicago voters. Be sure to include your confidence level and margin of error.

(b) (5 points) The people you asked were all of the registered voters in your school district. Write a press release summarizing your result about the voters in your school district. Do you need to include a confidence level and margin of error for this result? Explain.

6. (5 points each) When rolling a pair of six-sided dice. you are twice as likely to roll a seven (*i.e.*, the numbers on the two dice sum to seven) as you are to roll a four. Let's see if this is also true when rolling a pair of four-sided dice. (The faces of a four-sided die are numbered 1, 2, 3, and 4. Each of the four faces is equally likely to be the face rolled.)

   (a) What is the probability of rolling a four with a pair of four-sided dice? Show your work.

   (b) What is the probability of rolling a seven with a pair of four-sided dice? Show your work.

   (c) With a pair of four-sided dice, are you twice as likely to roll a seven as you are to roll a four? Explain.