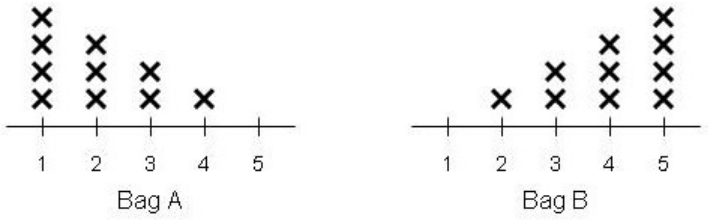
Math 121 **Test #1** **Fall 2005**

1. (21 pts) There are two bags, Bag A and Bag B, which appear identical from the outside. Each bag contains 10 vouchers, with values distributed as shown in the diagram below. You are presented with one of the bags and you draw a voucher from it. Based on the value of the voucher that you drew, you will decide whether you believe it was from Bag A or Bag B. The null and alternative hypotheses are

   H_0**:** The bag is Bag A.

   H_1**:** The bag is Bag B.

   Your decision rule is to conclude that the bag was Bag B if the voucher is worth at least \$4.



   (a) (3 pts) What is the direction of extreme?

   (b) (4 pts) What is the value of α?

   (c) (4 pts) What is the value of β?

   (d) (4 pts) If the voucher is worth \$3, what is the p-value?

   (e) (3 pts) If the voucher is worth \$5, what is the p-value?

   (f) (3 pts) If the voucher is worth \$3 and you decide the bag was Bag A, which type of error might you have made?

2. (6 pts) Some television stations take quick polls of public opinion by announcing a question on the air and asking viewers to call one of two telephone numbers to register their opinion as Yes or No. Telephone companies make available "900" numbers for this purpose. Dialing such a number results in a small charge to your telephone bill. One such call-in poll finds that 73% of those who called are opposed to a proposed local gun control ordinance. Give two reasons why this survey may be biased. In answering this question, assume that the purpose of the poll was to assess the proportion of all adults in the viewing area who oppose the ordinance.

3. (9 pts) Mr. Jones' statistics class has 17 students, who sit in rows 1 - 4.

   Row 1: Arlene, Bret, Cindy, Dennis

   Row 2: Emily, Franklin, Gert

Row 3: Harvey, Irene, Jose, Katrine, Lee

Row 4: Maria, Nate, Ophelia, Philippe, Rita

To select a random sample from the class, Mr. Jones decides to select 2 (different) rows at random and then include all the student in those two rows in his sample.

(a) What sampling method is Mr. Jones using?

(b) By this sampling method, what is the probability that Emily will be in the sample?

(c) Using a seed of 154 in your TI-83, tell which two rows Mr. Jones will select.

4. (12 pts) In the previous problem, suppose Mr. Jones asks each student whether he or she has ever downloaded music to a PC illegally. He then calculates the proportion of the students in the sample who say Yes.

(a) What is the variable of interest?

(b) Is this a qualitative or a quantitative variable?

(c) Which does Mr. Jones' calculation produce?

i. A parameter

ii. A variable

iii. A statistic

iv. A sample

(d) What type of bias may be present in Mr. Jones' survey? Explain.

5. (9 pts) Mr. Jones does another study. This time he divides his students by sex. He then selects at random 3 males and 3 females. He asks each of the 6 students how many varsity teams at the school he or she belongs to, suspecting that boys belong to more teams, on the average, than girls do.

(a) What sampling method did Mr. Jones use?

(b) What is the variable that Mr. Jones is measuring?

(c) Is the variable qualitative, quantitative continuous, or quantitative discrete?

6. (18 pts) Allegra is a prescription medication that "provides nondrowsy allergy relief from seasonal allergy symptoms." In a test conducted by allergists, each subject was given either Allegra or a placebo. An hour later, the researchers asked the subjects whether they felt drowsy. Their conclusion was that drowsiness in people who took Allegra was similar to the drowsiness those who took a placebo (1.3% vs. 0.9%). These results were based on a double-blind, randomized, placebo-controlled study. The null and alternative hypotheses were

H_0**:** The percentage of Allegra patients experiencing drowsiness is the same as the percentage of placebo patients experiencing drowsiness.

H_1**:** The percentage of Allegra patients experiencing drowsiness is greater than the percentage of placebo patients experiencing drowsiness.

The test results were found to be not significant at the 5% level.

(a) Which hypothesis was supported?

(b) What type of error could have been committed?

(c) Give a possible p-value for the test results.

(d) Was this an observational study or a designed experiment? Explain.

(e) What is the explanatory variable.

(f) What is the response variable.

7. (12 pts) The following table shows the suicide rates for the 5 countries with the highest suicide rates.

Country	Suicides per 100,000 inhabitants per year
Lithuania	42.0
Russia	37.4
Belarus	35.0
Latvia	34.3
Estonia	33.2

Source: `http://www.aneki.com/suicide.html`

(a) (3 pts) Which type of graphic would be more appropriate for these data, a bar graph or a histogram? Explain.

(b) (3 pts) Explain why a pie chart would not be an appropriate graphic for these data.

(c) (6 pts) Draw the graphic that you selected in part (a). Remember the "Postage Stamp" Rule: I should not be able to cover your diagram with a postage stamp.

8. (13 pts) If you select a certain residential long distance company, you can earn AT&T points for different magazines. There are 25 magazines to choose from. The points needed to redeem each are listed below.

370	310	400	500	310	560	370	470	470	560
310	630	370	400	910	910	660	370	560	500
870	470	630	600	470					

(a) (5 pts) List the classes you will use to draw a histogram, showing both endpoints of each class and using an appropriate notation.

(b) (5 pts) Using the classes from part (a), draw a histogram of the data.

(c) (3 pts) Describe the shape of the distribution, using appropriate statistical terminology.