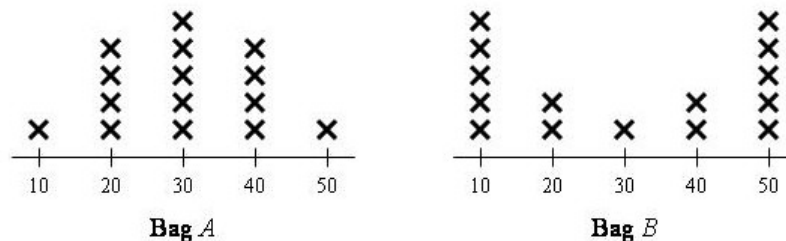


1. (8 pts) Given the hypotheses below, describe a Type I error and a Type II error. Do not simply recite the definition, but use the language of these hypotheses to describe the errors.

H_0 : North Korea has nuclear weapons.

H_1 : North Korea does not have nuclear weapons.

2. (17 pts) Two bags, Bag A and Bag B, each contain 15 vouchers with values from \$10 to \$50, as shown in the following diagram.



The bags are indistinguishable from the outside. We are presented with one of the bags and we will draw a voucher from it. Based on its value, we will decide which bag we were presented. The hypotheses are

H_0 : The bag is Bag A.

H_1 : The bag is Bag B.

The decision rule is to reject the null hypothesis if the value of the selected voucher is at least \$50 or at most \$10.

- (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) (3 pts) If the selected voucher has a value of \$40, what is the p -value?
 (e) (3 pts) Would a p -value of 0.05 lead to acceptance of H_0 or rejection of H_0 ?
3. (18 pts) The following excerpts are from an article on the website of the John S. and James L. Knight Foundation (www.knightfdn.org).

Survey Finds First Amendment Is Being Left Behind in U.S. High Schools

WASHINGTON, D.C. A new national study, the largest of its kind, says Americas high schools are leaving the First Amendment behind.

In particular, educators are failing to give high school students an appreciation of the First Amendments guarantees of free speech and a free press,

say researchers from the University of Connecticut, who questioned more than 100,000 high school students, nearly 8,000 teachers, and more than 500 administrators and principals.

...

Among its findings:

Nearly three-fourths of high school students either do not know how they feel about the First Amendment or admit they take it for granted. Seventy-five percent erroneously think flag burning is illegal. Half believe the government can censor the Internet. More than a third think the First Amendment goes too far in the rights it guarantees. "These results are not only disturbing; they are dangerous," said Knight Foundation President and CEO Hodding Carter III. "Ignorance about the basics of this free society is a danger to our nations future."

In addition, the more students are exposed to the First Amendment and use the news media in the classroom, and the more involved they are in student journalism, the greater their appreciation of First Amendment rights.

Among those students who have taken courses dealing with the media or the First Amendment, for example, 87 percent believe people should be allowed to express unpopular opinions. Among students who have not taken such courses, however, the number fell to 68 percent.

In the following questions, consider only the students in the survey, not the teachers or administrators and principals.

- (a) What is the sample in this situation?
 - (b) What is the sample size?
 - (c) What is the population in this situation?
 - (d) Was this study an observational study or an experiment? Explain.
 - (e) In the third paragraph, is the $3/4$ figure a statistic or a parameter?
 - (f) The last paragraph identify the explanatory variable and the response variable.
4. (20 pts) Suppose that a group of people consists of 100 males and 200 females. The males are numbered 1 - 100 and the females are numbered 1 - 200. You wish to take a sample of 6 from this group. You decide to choose 2 males and 4 females, to give the two sexes equal representation in the sample.
- (a) Using a seed of 123, use the TI-83 to choose 2 males at random.
 - (b) Using a seed of 456, use the TI-83 to choose 4 females.
 - (c) What sampling method is being used here?
 - (d) Are all people, whether male or female, equally likely to be chosen?
 - (e) In the previous problem, had you decided to choose only males for your sample, what kind of bias would be present? Explain.

5. (15 pts) A study was done to determine which kind of sock is best at preventing blisters on backpackers' feet. The study involved 60 backpackers. They were randomly divided into 3 groups of 20 each. One group was given wool socks, another was given cotton socks, and the other was given polypropylene socks. In each group, half of them wore the socks while backpacking in hot weather and the other half wore the socks while backpacking in cold weather. After the hikes, each hiker reported the number of blisters that he had.
- Was this an observational study or an experiment?
 - How many treatments were there?
 - Was replication used in this study?
 - If the purpose of the study was to show that polypropylene socks are best, and the hikers knew that and they knew which kind of sock they were wearing, what kind of bias might be present?
 - If it was discovered that one group hiked on flat land while another group hiked in mountainous terrain, what kind of factor would this be?
6. (8 pts) Determine whether the following variables are qualitative, quantitative discrete, or quantitative continuous.
- Whether a homeowner owns a firearm.
 - A student's major in college.
 - The amount of fat in a person's diet as a percentage of total food intake.
 - The number of firearms owned by a homeowner.
7. (14 pts) The heights of students in this class are

65 66 67 68 68 68 69 69 69 69
 70 70 70 70 71 71 72 72 73 73
 74 74 75 77 77

- (3 pts) Which type of diagram would be more appropriate for these data, a bar graph or a histogram? Explain.
- (8 pts) Draw the type of diagram that you selected in part (a) for these data.
- (3 pts) Which of the following characteristics does your diagram exhibit?
 - symmetric
 - unimodal
 - bimodal
 - uniform
 - skewed right
 - skewed left