

## Graded Homework Set # 4 – Statistics Math 135

A random sample of 599 people found that 43 people used hearing aids.

1. Find a point estimate of the true proportion of people who used hearing aids. (See page 478)
2. The sample proportion,  $\hat{p}$ , is the best point estimate of the population proportion, that is, it is an unbiased estimator. Explain in detail what is meant by being an unbiased estimator? (See page 141)
3. Construct a 90% confidence interval for the true proportion of people who use hearing aids. (See page 479)
4. If 39 packages are randomly selected from packages received by Federal Express and the sample average weight of these 39 packages is 15.3 kilograms with a standard deviation of 1.9 kilograms, which is the 95% confidence interval estimate for the true mean weight,  $\mu$ , of all packages received by the Federal Express? (Use the z value, not the t value) (See Example page 450)
  - A.)  $14.7 < \mu < 15.9$
  - B.)  $14.5 < \mu < 16.1$
  - C.)  $14.6 < \mu < 16.0$
  - D.)  $14.8 < \mu < 15.8$
5. For problem #4, what is the value of the error of the estimate, sometimes called the margin of error? (See page 457)
6. What is the critical value of  $z_{\frac{\alpha}{2}}$  that corresponds to a degree of confidence of 91%? (See pages 450 and 456)
7. Assume that we want to estimate the average (mean) IQ score for the population of United States sailors. How many sailors must be randomly selected for IQ testing if we wish to be 95% confident that the sample mean is within 2 IQ points of the population mean? (See page 457)
8. The health of the bear population in Yellowstone National Park is monitored by periodic measurements taken from anesthetized bears. A sample of 54 bears has a mean weight of 182.9 pounds. Assuming that  $\sigma$  is known to be 121.8 pounds, use a 0.10 level of significance to test the claim that the population mean of all such bear weights is less than 200 pounds.
  - a. List your  $H_0$  and  $H_1$ . (page 507 and 514)
  - b. What is your critical value of z? (page 517)
  - c. What is your test value of the statistic, called  $z_{\text{test}}$  or  $z_0$ ? (Page 518)
  - d. Do we reject or accept  $H_0$ ?
  - e. Why or why not?
  - f. What is the p-value for this testing procedure? (Page 521)

9. Identify which is the correct null hypothesis  $H_0$  and the alternative  $H_1$  for the following hypotheses testing problem: (Page 507)

A cereal company claims that the mean weight of the cereal in its packets is at least 14 ounces.

- A.)  $H_0 : \mu < 14$       B.)  $H_0 : \mu = 14$       C.)  $H_0 : \mu > 14$       D.)  $H_0 : \mu = 14$   
 $H_1 : \mu \geq 14$        $H_1 : \mu < 14$        $H_1 : \mu \leq 14$        $H_1 : \mu > 14$

10. In 1990, the average farm size in Kansas was 694 acres, according to data obtained from the U.S. Department of Agriculture. A researcher claims that farm sizes are larger now due to consolidation of farms. He obtains a random sample of 40 farms and determines the mean size to be 731 acres. Assume that  $\sigma = 212$  acres. Test the researcher's claim at the  $\alpha = 0.05$  level of significance. Ensure that all questions posed in the Testing Hypotheses instructions in problem 8 above are answered. (see section 10.1)