

Assignment-I on Testing of Hypotheses

1. Teenagers (age 15 to 20) make up 7% of the driving population. The article "More States Demand Teens Pass Rigorous Driving Tests" (*San Luis Obispo Tribune*, January 27, 2000) described a study of auto accidents conducted by the Insurance Institute for Highway Safety. The Institute found that 14% of the accidents studied involved teenage drivers. Suppose that this percentage was based on examining records from 500 randomly selected accidents. Does the study provide convincing evidence that the proportion of accidents involving teenage drivers differs from .7, the proportion of teens in the driving population? Write H_0 and H_1 .
2. A researcher is interested in determining if children have average cholesterol levels that are higher than the national average. Suppose that the distribution of cholesterol levels in children is normal with a population standard deviation 15. If the national average cholesterol is 190 and a sample of 100 children yields sample mean cholesterol of 196.2 determine if children have mean cholesterol levels higher than the national average. Write H_0 and H_1 .
3. The mean area μ of the several thousand apartments in a new development is advertised to be 1250 square feet. A tenant group thinks that the apartments are more than the advertised size. They hire an engineer to measure a sample of apartments to test their suspicion. the appropriate null and alternative hypothesis for μ is
 - (a) $H_0 : \mu = 1250$ against $H_a : \mu \neq 1250$
 - (b) $H_0 : \mu = 1250$ against $H_a : \mu < 1250$
 - (c) $H_0 : \mu = 1250$ against $H_a : \mu > 1250$
 - (d) can not be specified without knowing the size of the sample used by the engineer.
4. An insurance company sets up a statistical test with a null hypothesis that the average time for processing a claim is 7 days, and an alternative hypothesis that the average time for processing a claim is greater than 7 days. After completing the statistical test, it is concluded that the average time exceeds 7 days. However, it is eventually learned that the mean process time is really 7 days. What type of error occurred in the statistical test.
 - (a) A type I error
 - (b) A type II error
 - (c) No error has been committed
 - (d) Error committed can not be determined without more information
5. A medical researcher is working on a new treatment for a certain type of cancer. The average survival time after diagnosis on the standard treatment is two years. In an early trial, she tries the new treatment on three subjects who have an average survival time after diagnosis of four years. Although the survival time has doubled, the results are not statistically significant (that is, fail to reject the null hypothesis). Suppose, in fact, that the new treatment does increase the mean survival time in the population of all patients with this particular type of cancer. Which of the following statement is true?
 - (a) A type I error has been committed
 - (b) A type II error has been committed
 - (c) No error has been committed
 - (d) Error committed can not be determined without more information
6. Which of the following is not one of the forms possible for an alternative hypothesis in testing mean μ ?
 - (a) H_a : population characteristic \neq hypothesized value
 - (b) H_a : population characteristic $<$ hypothesized value
 - (c) H_a : population characteristic \neq hypothesized value
 - (d) H_a : Population characteristic = hypothesized value