This is a closed book, closed note test, and should be your work only. You may use a calculator as well as the provided formula sheet and tables during this exam. Stay calm, read all of the instructions, and show your work when applicable. If you use your calculator, please indicate what keys you are choosing. Some unjustified answers will receive minimal credit.

1. *Playbill* is a magazine distributed around the country to people attending musicals and other theatrical productions. The mean annual household income for the population of *Playbill* readers is $119,155. Assume the standard deviation for the population is $20,700. A San Francisco civic group has asserted that the mean for theater goers in the Bay Area is higher. A sample of 60 theater attendees in the Bay Area showed a sample mean household income of $126,100.

   a. What hypothesis test should be used to test the claim of the San Francisco civic group?

   b. What are the null and alternative hypothesis for this test? Clearly label your variables.

   c. Find the test statistic.

   d. Find the \( p \)-value.

   e. At a significance level of \( \alpha = 0.05 \) should you reject or fail to reject the null hypothesis?

   f. In a complete sentence, write out the conclusion in the context of this example.
2. A survey of 611 office workers investigated telephone answering practices, including how often each office worker was able to answer incoming telephone calls and how often incoming telephone calls went directly to voice mail. A total of 281 office workers indicated that they never need voice mail and are able to take every telephone call.

a. Find the point estimate of the proportion of the population of office workers who are able to take every telephone call.

b. Find the margin of error at the 90% confidence level.

c. Find the 90% confidence interval for the proportion of the population of office workers who are able to take every telephone call.

d. Write out in a complete sentence what the confidence interval indicates in this context.

3. A large automobile insurance company selected samples of single and married male policy holders and recorded the number who made an insurance claim over the preceding three-year period.

a. What hypothesis test should be used to determine whether the claim rates differ between single and married male policy holders?

b. What are the null and alternative hypothesis for this test? Clearly label your variables. Do NOT perform the test.
4. A study by the Centers for Disease Control (CDC) found that, of people who smoked at some point in their lives, 50% have been able to kick the habit. Part of the study suggested that the success rate for quitting rose by education level. Assume that a sample of 100 college graduates who smoked at some point in their lives showed that 64 have been able to successfully stop smoking.

a. What hypothesis test should be used to determine whether the population of college graduates has a success rate higher than the overall population when it comes to breaking the smoking habit?

b. What are the null and alternative hypothesis for this test? Clearly label your variables. Do NOT perform the test.

5. In a study conducted to investigate browsing activity by shoppers, each shopper was initially classified as a nonbrowser, light browser, or heavy browser. For each shopper, the study obtained a measure to determine how comfortable the shopper was in a store with higher scores indicating greater comfort level.

a. What hypothesis test should be used to determine whether mean comfort level is different for the three types of browsers?

b. What are the null and alternative hypothesis for this test? Clearly label your variables. Do NOT perform the test.

6. Circle T if the statement is true or F if the statement is false

T F If \( p = 0.018 \), you should reject the null hypothesis if \( \alpha = 0.01 \).

T F If \( p = 0.03 \), you should reject the null hypothesis if \( \alpha = 0.05 \).
7. The percentage of people not covered by health care insurance in 2003 was 14.6%. A congressional committee has been charged with conducting a sample survey to obtain more current information. What sample size should be used if the committee’s goal is to estimate the current proportion of individuals without health care insurance with a margin of error of 0.03 at the 95% confidence level?

8. During the first 13 weeks of the television season, the Saturday evening 8:00 p.m. to 9:00 p.m. audience proportions were recorded as ABC 29%, CBS 28%, NBC 25%, and independents 18%. A sample of 300 homes two weeks after a Saturday night schedule revision was conducted to determine whether the viewing audience proportions had changed.

   a. What hypothesis test should be used to determine whether the viewing audience proportions had changed.

   b. What are the null and alternative hypothesis for this test? Clearly label your variables. Do NOT perform the test.

9. A study was conducted on the mean cost of one day of a hospital stay to compare the difference in costs between 2005 and 2006. For 2005 a sample of 80 was collected and the mean cost of one day in a semiprivate room was reported to be $4848. In 2006 a sample of 60 was collected and the mean cost of one day in a semiprivate room was reported to be $5260. Historical data indicate that a population standard deviation of $800 is a reasonable assumption for both years.

   a. Find the point estimate of the difference between the mean prices for 2005 and 2006.

   b. Find the margin of error at the 99% confidence level.

   c. Find the 99% confidence interval for the difference in the mean cost of one day in a semiprivate room from 2005 to 2006.
10. An extensive study of the cost of health care in the US presented data showing that the mean spending per Medicare enrolled in 2003 was $6883. To investigate difference across the country, a researcher took a sample of 40 Medicare enrollees in Indianapolis. For the Indianapolis sample, the mean 2003 Medicare spending was $5980 and the standard deviation was $2518.

a. What hypothesis test should be used to determine whether the mean annual Medicare spending in Indianapolis is lower than the national mean?

b. What are the null and alternative hypothesis for this test? Clearly label your variables.

c. Find the test statistic.

d. Find the p-value

e. At a significance level of $\alpha = 0.05$ should you reject or fail to reject the null hypothesis?

f. In a complete sentence, write out the conclusion in the context of this example.