Make sure to include all of the following elements:

- State the null and alternative hypotheses.
- Determine and compute the appropriate test statistics.
- Determine the rejection region or compute the p-value (as requested)
- Decide if the null hypothesis should be rejected, explain why and what it means for alternative hypothesis
- State your conclusion in words, answer question posed in the problem.

1. The owner of a construction company would like to know if his current work crew takes on average less time to build a deck on a house than his past crews. He knows that the average time it took his past crews to build a deck is 17 hours. A random sample of 9 decks that the current crew has built resulted in a sample mean of building time of 15 hours and a sample standard deviation of 4 hours. Conduct the appropriate hypotheses test at $\alpha = 0.01$ Assume that times it takes his current crew to build the decks are normally distributed.

2. The heights of young women are normally distributed with mean $\mu$ and standard deviation $\sigma=2.4$ inches. A random sample of 34 women had a sample mean of 68.5 inches Do we have sufficient evidence that $\mu$ is greater than 67 inches? Use $\alpha =.05$

3. Suppose you test null hypothesis $H_0 : \mu = 16$ versus $H_a : \mu \neq 16$. Answer the following questions:
   a) If test statistics $z = 1.25$, compute the p-value and decide if $H_0$ be rejected or not at $\alpha = 0.05$?
   b) If test statistics was $z = 3.14$, use $\alpha = 0.05$, find the rejection region and decide if there is sufficient evidence for alternative hypothesis at $\alpha = .05$.
   c) If the p-value for the test was .068, would you reject $H_0$ at 5% significance level?
   d) If p-value was .084, and test statistic was positive, what would the p-value be if we change alternative hypothesis to $H_a : \mu > 16$ ?
   e) Suppose We rejected null hypothesis and later we find out that true population mean was 16. Was our decision to reject correct? If not, what type of error was made?
   f) Suppose 95% CI for $\mu$ was (14.6, 17.8). Based on that interval, would the null hypothesis be rejected or not?
   g) Suppose 95% CI for $\mu$ was (12.6, 15.1), would you reject null hypothesis based on that CI?

Solutions

Chapt 9

1) $H_0 : \mu = 17, \ H_a : \mu < 17 \ n = 9 \ d.f. = 8 \ Critical \ value \ t = -2.896, \ Test \ Stat \ t = -1.5$
   Do not reject $H_0$, (we do not have sufficient evidence at the $\alpha = 0.01$ level because our test statistic is not in the rejection region) The P-value is between .05 and .10. (.0860 by calculator T-Test)
   “At the .01 level, there is not sufficient evidence that the mean time is less than 17 hours.”

2) $H_0 : \mu = 67, \ H_a : \mu > 67 \ n = 34 \ Critical \ value \ z = 1.645, \ Test \ Stat \ z = 3.64$
   Reject $H_0$ in favor of $H_a$, (we have sufficient evidence at the $\alpha = 0.05$ level because our test statistic is in the rejection region) The P-value is about .0001
   “At the .05 level, we have sufficient evidence that the mean height is greater than 67 inches.”

3a) $P$ is about .2112. do not reject $H_0$ because $P > \alpha$
   b) Rejection region $z < -1.96$ or $z > 1.96$, there is sufficient evidence for $H_a$ because $z=3.14$ is in the rejection region
   c) No, because $P > \alpha$
   d) .042
   e) No, Type I error
   f) $H_0$ would not be rejected, because 16 lies in the interval.
   g) $H_0$ would be rejected, because 16 is not in the interval