

MAT1080 Worksheet #7
One Population Test of Mean

NAME: _____

1. Students estimated the length of one minute without reference to a watch or clock, and the times (in seconds) that actually went by are listed below. Use a 0.05 significance level to test the claim that these times are from a population with mean equal to 60 seconds. Does it appear that students are reasonably good at estimating one minute? Assume times are normally distributed.

69 81 39 65 42 21 60 63 66 48 64 70 96 91 65

a. Identify and/or use technology to calculate the following (use 1 decimal places):

$\mu =$ $\bar{x} =$ $s =$ $n =$

b. State the null and alternative hypotheses. Be sure to use the correct symbols. Indicate which of the two claims is also the original claim.

H_0 :

H_1 :

3. Given the inequality in H_1 , is this a left-tailed, right-tailed, or two-tailed test? State your reason.

4. Calculate the test statistic t . OK to use technology, but first state the equation that would be used to calculate t when doing a one-population test of mean when the population standard deviation is unknown.

$t =$

5. Use the critical value method with a 0.05 significance level to test the claim that the mean of the population equals 60 using the following steps:

(a) What is α , the area in the excluded tail(s) in #3?

(b) Given α and the answer from #3, find the critical value(s), t_c . Left-tailed should have a negative answer, right-tailed a positive answer, and two-tailed have two values (+ or – the same number).

$$\text{d.f.} = n - 1 = \quad \quad \quad t_c =$$

(c) Draw a graph showing the test statistic, critical value(s), and critical region.

(d) By comparing t and t_c , do we “reject” or “fail to reject” the null hypothesis (there are only two choices)? Be clear on your comparison.

(e) What can we conclude about the original hypothesis? Be sure to include language including one of the four phrases “there is sufficient evidence to reject the claim that ...”, “there is not sufficient evidence to reject the claim that ...”, “there is sufficient evidence to support the claim that ...”, or “there is not sufficient evidence to support the claim that ...” See Table 8-3 on page 366 of the book if you are not clear when each phrase is appropriate.

6. Use the P-value method with a 0.05 significance level to test the claim that the population mean equals 60 using the following steps:

(a) What is α , the area in the excluded tail(s) in #3?

(b) From the test statistic, find the P-value. If two-tailed, make sure the P-value includes both tails (depending on how you get it, you may or may not need to double the result).

P-value =

(c) Draw a graph showing the test statistic and P-value (if two-tailed, you will want to show z and $-z$, so that you can indicate the two regions that add up to the P-value).

(d) By comparing α and P-value, do we “reject” or “fail to reject” the null hypothesis (there are only two choices)? Be clear on your comparison.

(e) What can we conclude about the original hypothesis? Be sure to include language including one of the four phrases “there is sufficient evidence to reject the claim that ...”, “there is not sufficient evidence to reject the claim that ...”, “there is sufficient evidence to support the claim that ...”, or “there is not sufficient evidence to support the claim that ...” See Table 8-3 on page 366 of the book if you are not clear when each phrase is appropriate.

7. Use the sample data to construct a 95% confidence interval estimate of the population mean. What does the confidence interval suggest about the claim that the population mean equals 60? Use of technology OK, equation is already shown below. The equation shown is for when the population standard deviation is unknown.

$$E = t_{\alpha/2} \frac{s}{\sqrt{n}} \quad \bar{x} - E < \mu < \bar{x} + E \quad d.f. = n - 1$$

8. Compare the results from the critical value method, the P-value method, and the confidence interval method. Do they all lead to the same conclusion?