

Quiz# 1

Name:

ID#:

Section#: (1) 2

Serial#:

Show your work in detail

The cost of a college education has increased at a much faster rate than costs in general over the past twenty years. In order to compensate for this, many students work part- or full-time in addition to attending classes. At one university, it is believed that the average hours students work per week exceeds 20. To test this at a significance level of 0.05, a random sample of $n = 20$ students was selected and the following values were observed:

26	15	10	40
10	20	30	36
40	0	5	10
20	32	16	12
40	36	10	0

$$\bar{x} = 20.4$$

$$s = 13.61$$

$$n = 20$$

Based on these sample data, which of the following statements is true?

- The standard error of the sampling distribution is approximately 3.04.
- The test statistic is approximately $t = 0.13$.
- The research hypothesis that the mean hours worked exceeds 20 is not supported by these sample data.
- (d) All of the above are true.

Assumptions:

- Small sample ($20 < 30$)
- Assume normal population
- σ is unknown

$$H_0: \mu \leq 20 \quad \alpha = 0.05$$

$$H_A: \mu > 20$$

So, the t -statistic is used \Rightarrow

$$t_{\alpha, n-1} = t_{0.05, 19} = 1.7291$$

$$t_0 = \frac{\bar{x} - \mu_0}{s/\sqrt{n}} = \frac{20.4 - 20}{13.61/\sqrt{20}} = 0.131 = \frac{0.4}{3.04}$$

DR: If $t_0 > t_{\alpha, n-1} \Rightarrow$ Reject H_0 .

Since $t_0 = 0.131 \not> 1.7291 = t_{\alpha, n-1} \Rightarrow$ Do NOT reject H_0 .

Conclusion: The average working hours do NOT exceed 20 hrs/week at 5% sig. level.

With My Best Wishes

Name: _____

Quiz# 1

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Show your work in detail

The R.D. Wilson Company makes a soft drink dispensing machine that allows customers to get soft drinks from the machine in a cup with ice. When the machine is running properly, the average number of fluid ounces in the cup should be 14. Periodically the machines need to be tested to make sure that they have not gone out of adjustment. To do this, six cups are filled by the machine and a technician carefully measures the volume in each cup. In one such test, the following data were observed:

14.25	13.7	14.02
14.13	13.99	14.04

Based on these sample data, which of the following is true if the significance level is .05?

- a. No conclusion can be reached about the status of the machine based on a sample size of only six cups.
- b. The null hypothesis cannot be rejected since the test statistic is approximately $t = .27$, which is not in the rejection region.
- c. The null hypothesis can be rejected since the sample mean is greater than the hypothesized mean.
- d. None of the above.

$H_0: \mu = 14$
 $H_A: \mu \neq 14$

$n = 6$
 $\bar{x} = 14.02$
 $s = 0.184$
 $\alpha = 0.05$

- Assumptions:
- ① Small sample ($6 < 30$)
 - ② Normal population assumed.
 - ③ σ is unknown.

So, the t-statistic is used: \Rightarrow

$t_{\frac{\alpha}{2}, n-1} = t_{0.025, 5} = 2.5706$

$t_o = \frac{\bar{x} - \mu_o}{s/\sqrt{n}} = \frac{14.02 - 14}{0.184/\sqrt{6}} = 0.267$

DR: If $|t_o| > t_{\frac{\alpha}{2}, n-1} \Rightarrow$ Reject H_0

Since $|t_o| = 0.267 \neq 2.5706 = t_{\frac{\alpha}{2}} \Rightarrow$ Do NOT reject H_0 .

Conclusion: The machine is NOT going out of adjustment at 5% sig-level.

With My Best Wishes