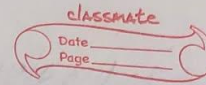


Homework - 9

Problem 24 on page 334



Given,

Sample size: $n = 58$ Sample mean: $\bar{x} = 191$ Sample standard deviation $s = 89$ Hypothesized mean $\mu_0 = 153$ Significance level $\alpha = 0.001$

*State hypotheses:

 H_0

Vs

 H_a : $\mu = 153$ $\mu > 153$

*Test Statistic

$$t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}} = \frac{191 - 153}{89/\sqrt{58}}$$

$$= \frac{38}{11.68} \approx 3.25$$

*p-value

$$\text{Degree of freedom} = n - 1 = 57$$

$$\text{Critical value } t_{0.001, 57} \approx 3.460$$

$$t \approx 3.25$$

Since,

$$t = 3.25 < 3.460$$

we do not reject null hypothesis at 0.001 level.

2. Problem 25 on page 334

Given,

$$n = 52$$

$$\bar{x} = 1.95$$

$$s = 0.20$$

$$\mu_0 = 2.00$$

Significance level: $\alpha = 0.01$

State hypothesis

H_0 :

H_1 :

H_a :

$$\mu = 2.00$$

$$\mu < 2.00$$

* Test statistic

$$t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}} = \frac{1.95 - 2.00}{0.20/\sqrt{52}} = -1.80$$

P-value

$$df = n - 1$$

$$= 51$$

$$\alpha = 0.01$$

left-tailed
with 51

$$t_{0.01, 51} = -2.403$$

Since,

$$-1.80 > -2.403$$

we do not reject the null hypothesis

At the 0.01 significance level, there is not enough evidence to conclude that the true average task time is less than 2 seconds.

3. Problem 35(a) on page 345

Given,

$$n = 12$$

$$\bar{x} = 249.7$$

$$s = 145.2$$

$$\mu_0 = 200$$

$$\alpha = 0.05$$

Q.1.1

Hypothesis

H_0

$$\mu = 200$$

vs

H_a

$$\mu > 200$$

(right tailed)

Test statistic

$$t\text{-test} = t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}} = \frac{249.7 - 200}{145.2/\sqrt{12}} = 1.186$$

Critical,

$$t \approx 1.796$$

Since,

$1.186 < 1.796$, we fail to reject the null hypothesis

Conclusion:

At the 0.05 significance level there is not sufficient evidence to conclude that the true average repair time exceeds 200 minutes.

" Problem 40 on page 346

Given,

$$n = 10$$

$$\bar{x} = 51.3$$

$$s = 1.2$$

$$\mu_0 = 48 \text{ MPa}$$

$$\alpha = 0.05$$

hypothesis,

H_0

$$\mu = 48$$

V_s

H_a

$$\mu > 48$$

t-value

$$t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}} = \frac{51.3 - 48}{1.2/\sqrt{10}} = \frac{3.3}{0.3795} \approx 8.7$$

$$\text{Degree of freedom } df = n - 1 = 9$$

$$\alpha = 0.05$$

$$df = 9$$

$$t_{0.05, 9} \approx 1.833$$

At the 0.05 significance level there is strong evidence to conclude that the true average tensile strength of the 21-wt% cellulose composite exceeds 48 MPa (that of pure cellulose).