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

Degree of freedom $= n - 1 = 57$

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 : $\mu = 2.00$ vs H_a : $\mu < 2.00$

* 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 talk time is less than 2 seconds.

3. Problem 35(a) on page 345

Given,

$n = 12$

$\bar{x} = 249.7$

$s = 145.2$

$\mu_0 = 200$

$\alpha = 0.05$

a) Hypothesis

H_0 vs H_a

$\mu = 200$ $\mu > 200$

(right tailed)

Test statistic:

t-test $= t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}} = \frac{249.7 - 200}{145.1/\sqrt{12}}$

$= 1.186$

Critical,

$t \geq 1.796$

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,

$n = 10$

$\bar{x} = 51.3$

$s = 1.2$

$\mu_0 = 48$ MPa

$\alpha = 0.05$

Hypothesis.

H_0 vs H_a

$\mu = 48$ $\mu > 48$

t-value

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

$$= \frac{3.3}{0.3795} \approx 8.7$$

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 24-wt% cellulose composite exceeds 48 MPa (that of pure cellulose).