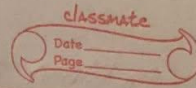


## Home work-10

1. Problem 7 on page 372



Given,

$$n_1 = 125$$

$$\bar{x}_1 = 2.7186$$

$$s_1 = 0.63342$$

[ Sample 1 ]

sample 2:

$$n_2 = 88$$

$$\bar{x}_2 = 2.8639$$

$$s_2 = 0.49241$$

Significance level:  $\alpha = 0.01$ 

State the hypotheses

Null Hypothesis

Alternative Hypothesis

$$H_0: \mu_1 = \mu_2$$

$$H_a: \mu_1 \neq \mu_2$$

\* Calculate the test statistic \*

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} = \frac{2.7186 - 2.8639}{\sqrt{\frac{0.63342^2}{125} + \frac{0.49241^2}{88}}} = -1.88$$

\* Degree of freedom:

$$df = \frac{(s_1^2/n_1 + s_2^2/n_2)^2}{\frac{(s_1^2/n_1)^2}{n_1-1} + \frac{(s_2^2/n_2)^2}{n_2-1}} \approx 222$$

The critical t-value

$$df \approx 222 \text{ and } \alpha = 0.01$$

$$t_{\text{critical}} \approx \pm 2.576$$

Decision:-

$$|t| = 1.88 < 2.576$$

we fail to reject the null hypothesis.

Problem 32 (b) on pages 81  
Given,

Group	Sample n	Sample $\bar{x}$	Sample SDs
Older	28	801	117
Younger	16	780	72

\*Hypothesis\*

$$H_0: \mu_1 = \mu_2$$

$$H_a: \mu_1 > \mu_2 \text{ (Right-tailed)}$$

\*Standard deviation\*

$$s_p = \sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}}$$

$$= 103.2$$

\*Test statistics

$$t = \frac{\bar{x}_1 - \bar{x}_2}{s_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} \approx 0.6495$$

\*Degree of freedom\*

$$df = n_1 + n_2 - 2$$

$$= 42$$

t-distribution table:-

$$t_{\text{critical (one-tailed, } \alpha = 0.05, df = 42)} \approx 1.682$$

\*Conclusion:-

$$t = 0.6495 < t_{\text{critical}} = 1.682$$

we fail to reject the null hypothesis



3. Problem 42 (a) on page 390

Let

$d_i = \text{Before} - \text{After}$

Data

Before:

After:

15	26	66	115	62	64
16	24	42	80	78	73

s.

Difference are:-

$$d = [-1, 2, 24, 35, -16, -9]$$

\*state the hypotheses\*

$H_0$

$$\mu_d = 0$$

$V_s$

$H_a$

$$\mu_d \neq 0$$

\*Compute sample statistics

$$\bar{d} = \frac{-1 + 2 + 24 + 35 - 16 - 9}{6}$$

$$\approx 5.83$$

$$s_d = \sqrt{\frac{\sum (d_i - \bar{d})^2}{n-1}} \approx 26.77$$

$$SE = \frac{s_d}{\sqrt{n}} \approx 10.93$$

\*Test statistic

$$t = \frac{\bar{d} - 0}{SE} \approx 0.534$$

\*Degree of freedom:

$$df = n - 1 = 5$$

\*p-value:-

$$p\text{-value} \approx 0.615$$

At,

$\alpha = 0.05$ , since  $p > \alpha$ , we fail to reject  $H_0$ .