Assignment 5
- Have a scenario on( one sample t test )
- Identify sample and population
- Extract information
- Write hypotheses
- Interpret results
- Make a conclusion

**Example One-Sample T-Test**

**Scenario:** A school claims that the average score of students in a mathematics test is **75**. However, a researcher believes that the actual average score might be different from this claimed average. To test this, the researcher collects a random sample of **20 students** and records their test scores. The sample mean score is **72.5**, and the sample standard deviation is **8**.The researcher then performs a one-sample t-test to determine if the mean test score in the sample is significantly different from the population mean of **75**.Significance level (α)= 0.05 .

## Identifying the Sample and Population:

- **Population:** All students in the school
- **Sample:** 20 student

## Extracting Information:

- Population mean (μ): 75
- Sample mean ($\bar{x}$): 72.5
- Sample size (n): 20
- Sample standard deviation (s):. 8
- Significance level (α): 0.05

## Writing Hypotheses:

- **Null Hypothesis ($H_0$):** $\mu = 75$
- **Alternative Hypothesis ($H_1$):** $\mu \neq 75$

## Performing the t-Test:

$$t = \frac{\bar{x} - \mu}{s/\sqrt{n}} = \frac{72.5 - 75}{8/\sqrt{20}} = -1.397$$

P value → two tailed
→ $df = 20 - 1 = 19$
→ $\alpha = 0.05$

$0.179 > 0.05$

$P\_value = 0.179$ $\quad$ $P\_value > \alpha$

**Interpreting Results:**

we can't reject Ho because p value is less than $\alpha$

**Conclusion:**

at $\alpha = 0.05$ we do not have enough evidence to say that the student average score is different than 75

2

**Example One-Sample T-Test**

**Scenario:** A coach claims that the average height of basketball players ~~in a league~~ is **6.5 feet**. A researcher wants to test whether the average height is different. The researcher collects a sample of **15 players** and records their heights. The sample mean height is **6.7 feet**, and the sample standard deviation is **0.3 feet**..The researcher then performs a one-sample t-test to determine if the mean test score in the sample is significantly different from the population mean.Significance level (α)= 0.05 .

## Identifying the Sample and Population:

- **Population:** All basket ball Players
- **Sample:** 15 player

## Extracting Information:

- Population mean (μ): 6.5
- Sample mean ($\bar{x}$): 6.7
- Sample size (n): 15
- Sample standard deviation (s):. 0.3
- Significance level (α): . 0.05

## Writing Hypotheses:

- **Null Hypothesis ($H_0$):** $\mu = 6.5$
- **Alternative Hypothesis ($H_1$):** $\mu \neq 6.5$

## Performing the t-Test:

$$t = \frac{\bar{x} - \mu}{s/\sqrt{n}} = \frac{6.7 - 6.5}{0.3/\sqrt{15}} = 2.58$$

P-value → two talied
→ df = 14
→ $\alpha = 0.05$

P-value = 0.022

## Interpreting Results:

P-value < $\alpha$

0.022 < 0.05

we reject Ho because P-value is less thand $\alpha$

**Conclusion:**

at $\alpha = 0.05$ there is enough evidence that the hieght of basketball player is different than 6.5

**Example One-Sample T-Test**

**Scenario: Scenario:** A social researcher claims that the average time people spend on social media is **3 hours per day**. However, a new survey suggests that the average might be different. The researcher collects data from a random sample of **30 individuals** and records their daily social media usage. The sample mean usage is **3.5 hours**, and the sample standard deviation is **0.8 hours**.

## Identifying the Sample and Population:

- **Population:** All people using social media
- **Sample:** 30 people using social media

## Extracting Information:

- Population mean (μ): 3
- Sample mean ($\bar{x}$): 3.5
- Sample size (n): 30
- Sample standard deviation (s):. 0.08
- Significance level (α): . 0.05

## Writing Hypotheses:

- **Null Hypothesis ($H_0$):** $\mu = 3$
- **Alternative Hypothesis ($H_1$):** $\mu \neq 3$

## Performing the t-Test:

$$t = \frac{\bar{x} - \mu}{s/\sqrt{n}} = \frac{3.5 - 3}{0.8/\sqrt{30}} = 3.42$$

p-value
- → two tailed
- → $\alpha = 0.05$
- → $df = 29$

p-value = 0.002

p-value $< \alpha$

## Interpreting Results:

$p < \alpha$ reject Ho because p less than α

$0.002 < 0.05$

**Conclusion:**

at $\alpha = 0.05$ there is enough evidence to conclude that the averge time people spend on social media is differnt than 3