# Report

**Problem Statement:**

Jawad hypothesized that the entire class achieved an average score of 70 out of 100 on the Mathematics Exam. To test this claim, he conducted an experiment by collecting the scores of 12 students and applying statistical analysis to verify his hypothesis.

**State the Hypothesis:**

Null Hypothesis (Ho):

The true population mean score for mathematics exam is 70.

$$\mu = 70$$

Alternate Hypothesis (Ha):

The true population mean score is not 70.

$$\mu \neq 70$$

**Data:**

|  | A | B |
|---|---|---|
| 1 | **Student** | **Score** |
| 2 | 1 | 70 |
| 3 | 2 | 74 |
| 4 | 3 | 72 |
| 5 | 4 | 68 |
| 6 | 5 | 77 |
| 7 | 6 | 80 |
| 8 | 7 | 75 |
| 9 | 8 | 73 |
| 10 | 9 | 78 |
| 11 | 10 | 76 |
| 12 | 11 | 71 |
| 13 | 12 | 79 |

**Statistical T Test (One Sample):**

| D | E | F | G | H | I | J | K | L | M |
|---|---|---|---|---|---|---|---|---|---|
| mean | hypothesis mean | v | s | X | T DIST LFT TAIL | t critical val | confidence interval(95%) | standard error | T RIGHT TAIL |
| 74.41667 | 70 | 11 | 3.752777 | 4.076923 | 0.001555767 | 2.59309268 | 77.22585041 | 1.083333333 | 0.000914875 |
| | | | | | | -2.5930927 | 71.60748293 | | |

$Figure.1$

**Analysis:**

According to Figure.1, in order to calculate T statistics (X)with following formula:

$$T = \frac{×` - \mu}{s/\sqrt{n}}$$

For that, following further formulas were calculated in excel:

- N= 12
- Sample mean (x`) =AVG (B2:B13)
- V (degree of freedom) =n-1= 11
- Standard Dev (S) =STDDEV.S(B2:B13)
- Standard Error= $s/\sqrt{n}$
- Confidence level= 95% =0.95
- Significance level (α)= 0.05
- α/2 = 0.025
- t critical value= T.INV.2T (α/2, V)
- Confidence Interval = x`± t critical. $s/\sqrt{n}$
- T distribution T. DIST () / P(x`<74.41) = P(T<4.076) =0.002
- T. DIST.RT (H2,11)

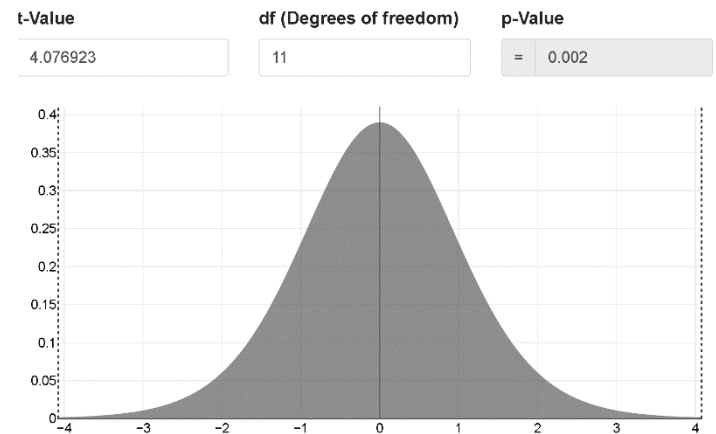| t-Value | df (Degrees of freedom) | p-Value |
|---|---|---|
| 4.076923 | 11 | = 0.002 |



*Fig.2*

**Results:**

From Figure.1 it is observed that T value is 4.07 which lies outside the range -2.59 – 2.59 of t critical value, t value is much greater than 2.59 plus T dis left tail < 0.05 (Significance level), which shows that statistical analysis is not just a guess but backed by statistical formulas. Hypothesis mean 70 lies outside the range of confidence interval 71.6 – 77.2

**Conclusion:**

It is concluded that since $\mu \neq 70$, rather $\mu >70$ because (T) 4.07 > 2.59 (t critical) & 0.002<0.05.

Hence, we *reject Null Hypothesis (Ho)* of Jawad and *pass alternate hypothesis (H1)* $\mu \neq 70$.