

Question no:2.

In a population the average score IQ is 100. A team of Scientists wants to ~~know~~ or test a new medicine to see if it has either positive or negative effect on intelligence or no effect at all. A sample of 29 participants who have taken the medicines has a mean of 140 with standard deviation of 20. Did the medicine medication affect intelligence.
 $\alpha = 0.05$.

Solution:

$$H_0: \mu = 100$$

$$H_1: \mu \neq 100$$

ii) Level of Significance $\alpha = 0.05$

iii) Test - Statistic: $t = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{n}}}$

iv) Critical region = $t_{\alpha/2, (n-1)} = 2.33$

v) Calculations:

$$\bar{x} = 140, \mu = 100, s = 20, n = 29$$

$$t = \frac{140 - 100}{\frac{20}{\sqrt{29}}}$$

$$t = \frac{40}{3.77} = 10.6$$

$$\text{Critical region} = |t| > t_{\alpha/2, (22)} \\ = 10.6 > 2.33$$

Decision: Reject H_0 .

Question:

A sample of 36 women resulted in mean height of "64" and sample mean variance 25. Are women on average shorter than 66. Use 5% level of significance.

1) $H_0: \mu = 66$

$H_1: \mu \neq 66$

2) Level of significance = 0.05

3) Test - statistic = $t = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{n}}}$

4) Calculations: $t = \frac{64 - 66}{\frac{5}{\sqrt{6}}} = -2.4$

5) Critical region: $\frac{5}{\sqrt{6}}$

$t_{\alpha(n-1)} = t_{0.05(35)} = 1.69$

6) Decision:

$-2.4 < -1.69 \Rightarrow$ Reject H_0
and we conclude that on average
women are shorter than "66".

Two Sample t-test.

The two sample t-test is used to determine if two population means are equal.

Test - Statistic:

$$t = \frac{(\bar{X}_1 - \bar{X}_2) + (k_1 - k_2)}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$$

$$d.f = t_{\alpha}(n_1 + n_2 - 2)$$