

Given the sample size $n = 25$

Sample mean $\bar{x} = 15$

Sample standard deviation $s = 3$

The population standard deviation $\sigma = 2$

The $(1 - \alpha) 100\%$ two side confidence interval for mean based on the sample data is

$$\bar{x} \pm Z_{1-\alpha/2} \frac{\sigma}{\sqrt{n}}$$

The hypotheses are

$$H_0: \mu = 12$$

$$H_1: \mu \neq 12$$

Here let $\alpha = 0.05$, $z_{1-\alpha/2} = z_{0.975} = 1.96$

so we are 95% and

the 95% CI is

$$15 \pm 1.96 \frac{2}{\sqrt{25}}$$

$$(14.216, 15.784)$$

So we are 95% confident that the population mean is between
(14.216, 15.784)

If $\mu_0 = 12.5$ not in the interval
(14.216, 15.784) reject the null hypothesis.

So this sample mean is significantly different from the population mean at 95% confidence.