

Answer Question #44756 – Math - Statistics and Probability

A road construction company tests the strength of the roads by testing 10km stretches which are core drilled. Compression strength of $\mu_0 = 12.5MPa$ is acceptable specification with a standard deviation of $\sigma = 1.625MPa$. A sample of $n = 50$ stretches were tested and the mean of the sample was $\bar{y} = 11.5MPa$.

- Set the acceptable criteria for the road strength plan. If a one tailed limit $\alpha = 0.05$ is used.
- Should the section of 50 sections tested be accepted?

Solution

- a. We need to construct confidence interval:

$$CI = \mu_0 \pm \frac{z_{\alpha}\sigma}{\sqrt{n}} = 12.5 \pm \frac{1.65 \cdot 1.625}{\sqrt{50}} = 12.5 \pm 0.379.$$

- b. $H_0: \mu = \mu_0$ $H_a: \mu \neq \mu_0$

$$z = \frac{\bar{y} - \mu_0}{\frac{\sigma}{\sqrt{n}}} = \frac{11.5 - 12.5}{\frac{1.625}{\sqrt{50}}} = -4.35.$$

Since $\frac{z_{\alpha}}{2} = z_{0.025} = 1.96$ and $z = -4.35 < -\frac{z_{\alpha}}{2}$ we reject null hypothesis (the section of 50 stretches should be rejected).