

### 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  $\mu_0 = 12.5 \text{ MPa}$  is acceptable specification with a standard deviation of  $\sigma = 1.625 \text{ MPa}$ . A sample of  $n = 50$  stretches were tested and the mean of the sample was  $\bar{y} = 11.5 \text{ MPa}$ .

a. Set the acceptable criteria for the road strength plan. If a one tailed limit  $\alpha = 0.05$  is used.

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