

### Answer on Question #42678 – Math - Statistics and Probability

The desired percentage of silicon dioxide in a certain type of cement is 5. A random sample of 36 specimens gave a sample average percentage of 5.21 and a sample standard deviation of 0.38. Use a significance level of 0.01 and test whether the sample result indicates a change in the average percentage.

#### Solution

$$H_0: \mu = 5 \quad H_A: \mu \neq 5 \quad \alpha = 0.01$$

The alternative hypothesis is  $\neq$ , indicating a two-tail test. The Central Limit Theorem applies therefore we use z-distribution.

Reject  $H_0$  if z-test  $> 2.58$  or z-test  $< -2.58$ .

$$z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}} = \frac{5.21 - 5.0}{\frac{0.38}{\sqrt{36}}} = 3.32.$$

Since  $3.32 > 2.58$  we reject  $H_0$  at the 0.01 level of significance. The sample evidence does suggest that there is a significant change in the average percentage of silicone dioxide in a certain type of cement.