

## Answer on Question #44304 – Math - Statistics and Probability

### Problem.

Engineers for a cell phone producer think that using Bluetooth decreases battery life. Average battery life is expected to be 23 hours. A sample of 20 phones was tested for battery life with Bluetooth enabled. The average for the sample was 22.5 hours with a standard deviation of 0.9 hours.

What is the null hypothesis?

What is the alternative hypothesis?

What is the test statistic  $t$  ?

What is the  $t$  value for a .05 one tailed critical (rejection) region?

Draw the rejection region.

### Solution.

Suppose that,  $\mu_0 = 23$  hours,  $n = 20$ ,  $\bar{x} = 22.5$  hours,  $s = 0.9$  hours,  $\alpha = 0.05$ .

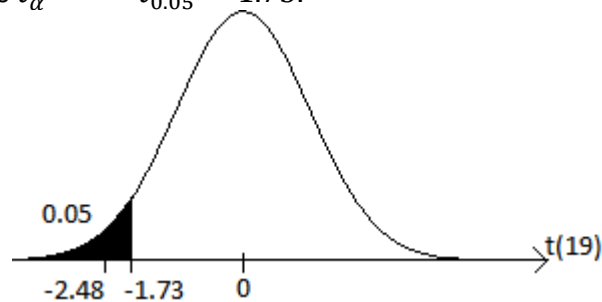
The null hypothesis is  $H_0: \mu = \mu_0$ .

The alternative hypothesis is  $H_1: \mu < \mu_0$  (since producer think that using Bluetooth decreases battery life).

The test statistic

$$t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}} = \frac{22.5 - 23}{0.9/\sqrt{20}} \approx -2.48.$$

There are degrees of freedom  $n - 1 = 20 - 1 = 19$ . Hence  $t$  value for a 0.05 one tailed critical (rejection) region is  $t_{\alpha}^{(n-1)} = t_{0.05}^{19} = 1.73$ .



$H_0$  is rejected.