

Answer on Question #46541 – Math -Statistics and Probability

A low-noise transistor for use in computing products is being developed. It is claimed that the mean noise level will be below the $\mu_0 = 3.00$ dB level of products currently in use. (Assume that noise level is normally distributed).

- i. Set up the appropriate null and alternative hypotheses for verifying the claim.
- ii. Find the critical point for 99% confidence test based on a sample of size $n = 20$. Using the values $\bar{x} = 2.2$ and $s = 0.88$ of sample mean and sample standard deviation, respectively, to test null hypothesis against alternative hypothesis defined in (i) at $\alpha = 0.01$. Justify.

Solution

- i. $H_0: \mu \leq \mu_0 = 3.00; H_a: \mu > \mu_0$.
- ii. The significance level $\alpha = 0.01$.

It is an one-sided test. Number of degrees of freedom $df = 20 - 1 = 19$. $t_{crit} = t_{0.01;19} = 2.86$.

$$t = \frac{\bar{x} - \mu_0}{\frac{s}{\sqrt{n}}} = \frac{2.2 - 3}{\frac{0.88}{\sqrt{20}}} = -4.065.$$

Don't reject H_0 because $t = -4.065 < t_{crit} = 2.86$.