Answer on Question #60753 – Math – Statistics and Probability

Question

A manufacturer of coffee vending machines has designed a new, less expensive machine. The current machine is known to dispense an average of 6 fl. oz., with a standard deviation of .2 fl. oz., into cups. When the new machine is tested using 15 cups, the mean and the standard deviation of the fills are found to be 6 fl. oz. and .214 fl. oz. Test H0: σ = 0.2 versus Ha: σ ≠ 0.2 at levels of significance .05 and .01. Assume normality. (Round your answer to 4 decimal places.)

Solution

$\mu = 6, \ \sigma = 0.2;$
$\bar{x} = 6, \ s = 0.214, \ n = 15.$

Null hypothesis H_0: $\sigma = 0.2$.
Alternative hypothesis H_a: $\sigma \neq 0.2$.

Test statistic $\chi^2 = (n-1)\left(\frac{s}{\sigma}\right)^2 = (15-1)\left(\frac{0.214}{0.2}\right)^2 = 16.0286.$

Degrees of freedom $df = 15 - 1 = 14.$

For $\chi^2 = 16.0286, \ df = 14,$ two tailed test: $p = 0.3083.$
To get p-value we use
http://www.socscistatistics.com/pvalues/chidistribution.aspx .
Therefore, for both levels of significance (0.05 and 0.01) we can't reject the null hypothesis and we should conclude that there is no significant difference in standard deviation between current and new machine.