Answer on Question #41393– Math – Statistics and Probability

The sample mean is $\bar{x} = \frac{23+19+26+22+18+27}{6} = \frac{135}{8} = 22.5$ (or via an Excel function =AVERAGE(23; 19; 26; 22; 18; 27))

The sample standard deviation is

$$s = \sqrt{\frac{\sum_{i=1}^{n}(x_i-\bar{x})^2}{n-1}} =$$

$$= \sqrt{\frac{(23-22.5)^2+(19-22.5)^2+(26-22.5)^2+(22-22.5)^2+(18-22.5)^2+(27-22.5)^2}{5}} = 3.62$$ (or via an Excel function =STDEV(23; 19; 26; 22; 18; 27)).

The formulation of the null and alternative hypotheses should be

$H_0: \mu = 20$ versus $H_1: \mu \neq 20$.

The *t* test statistic is

$T = \frac{\bar{x}-\mu_0}{\frac{s}{\sqrt{n}}} = \frac{22.5-20}{\frac{3.62}{\sqrt{8}}}$=1.95, degrees of freedom d.f.=*n-1*=6-1=5.

We test at the level of significance $\alpha = 0.05$. Since H_1 is two-tailed, we set the rejection region

$R: |T| \geq t_{0.025}$.

From the *t* table we find that $t_{0.025}$ with d.f.=5 is 2.571. Because the observed value *t*=1.95 is smaller than 2.571, the null hypothesis is not rejected at $\alpha = 0.05$.

Conclusion: there is strong evidence that the average dissolution time is 20 seconds (with $\alpha = 0.05$).

Minitab

Data: C1

Stat>Basic Statistics>1-Sample t.

Type C1 in *Samples in.*

Following *Test mean*, type 20, the value of the mean under the null hypothesis. Click Options and type 95 in *Confidence level*.

In the *Alternative* cell select *greater than*, the direction of the alternative hypothesis. Click *OK*. Click *OK*.

If the sample size, mean, and standard deviation are available, instead of the second step, type these values in the corresponding cells.