V. Owners of the Quick Chow Restaurant are concerned about the average time to serve customers at two of their stores. A sample of 32 customers at store A resulted in a mean service time of 80 seconds and a standard deviation of 8 seconds. A sample of 49 customers at store B resulted in a mean service time of 75 seconds and a standard deviation of 7 seconds. Test at the .02 level of significance whether the mean time to wait on customers at these two stores is the same.

Given:	$n_1 = 32$	$\bar{X}_1 = 80$ seconds	$S_1 = 8$	$\alpha = .02$
	$n_2 = 49$	$\bar{X}_2 = 75$ seconds	$S_2 = 7$	

1. $H_o : \mu_1 = \mu_2$ and $H_1 : \mu_1 \neq \mu_2$
2. Type I error is .02 and $\alpha/.02 = .02/2 = .01 \rightarrow \pm 2.33$
3. $\bar{x}$ is the test statistic.
4. If the z from the test statistic is beyond the critical value of z, reject H_0.
5. Apply the decision rule.

$$z = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

$$= \frac{80 - 75}{\sqrt{\frac{(8)^2}{32} + \frac{(7)^2}{49}}}$$

$$= \frac{5}{\sqrt{2 + 1}}$$

$$= 2.89$$

Reject H_0 because 2.89 is beyond 2.33.

Mean time to wait on customers differs at these two stores.

Reject | Accept | Reject

.01 | .49 | .49 | .01

z = -2.33 | z = +2.33

critical values
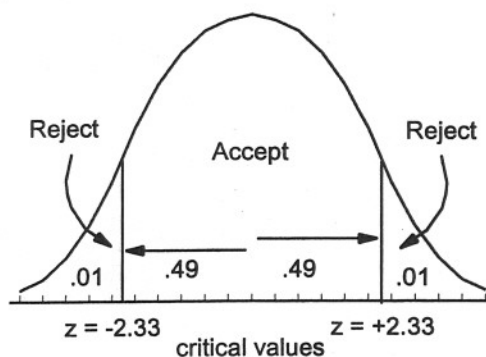
VI. Before recent improvements, it took 36.4 minutes to assemble a part. After improvements, a sample of 16 had an average assembly time of 34 minutes. The sample standard deviation was 2.4 minutes. Test at the .01 level of significance whether improvements lowered assembly time.

Given:	$\mu = 36.4$	$n = 16$	$\bar{X} = 34$	$S = 2.4$	$\alpha = .01$

1. $H_o : \mu \geq 36.4$ and $H_1 : \mu < 36.4$
2. Type I error is .01.
3. $\bar{x}$ is the test statistic.
4. If t for the test statistic is beyond the critical value of t, reject H_0.
   df = n - 1 = 16 - 1 = 15 $\rightarrow t = \pm 2.602$ for the .01 level of significance
5. Apply the decision rule.

$$t = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{n}}}$$

$$t = \frac{34.0 - 36.4}{\frac{2.4}{\sqrt{16}}} = \frac{-2.4}{.6} = -4$$

Reject H_0 because -4 is beyond -2.602.

Assembly time went down.