§8.5 Test of Hypothesis about Population Mean; t-stat.

This is the same as 8.2 or 8.4 except for $n < 30$. Since we have small samples, we use t_α or $t_{\alpha/2}$ instead of z_α or $z_{\alpha/2}$. The population must be normal.

$$t_c = \frac{\bar{x} - \mu_0}{s/\sqrt{n}}$$

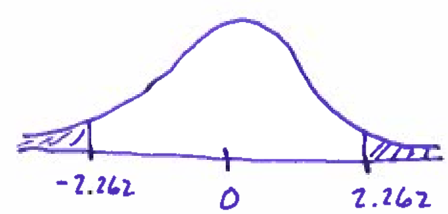
Remember that for t_α we use $df = n-1$

Example the average low tempature in Detroit, Michigan in February is 12° F. A random sample of 10 different years average temprature in Feb. is listed below. Test if the data suggests that the average temperature is actually different than 12° F at a significance level of 5%.

12.4, 11.0, 10.9, 11.8, 12.2, 11.4, 10.8, 12.2, 12.3, 10.0

$df = 10 - 1 = 9$, so $t_{\alpha/2} = 2.262$

$H_0: \mu = 12$, $H_a: \mu \neq 12$



Stats → tests → t-test ⇒

$\mu \neq 12$

$t_c = -1.956$

$p = 0.0822$

$\bar{x} = 11.5$

$s = 0.8063$

$n = 10$

t_c is not in the rejection region and $p > \alpha$, so Fail to reject H_0 at a significance level of .05 (observed signifieance leve was .0822).

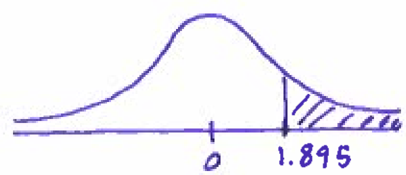
Example An educator claims that the average salary of substitute teachers in a particular State is greater than \$55 per day. A random sample of eight school districts in the state are selected and the average daily salaries (in dollars) are shown. Is there enough evidence to support the educators claim at $\alpha = .05$? Assume normallity.

60, 56, 60, 55, 70, 60, 55

$H_0: \mu = 55$, $H_a: \mu > 55$

$df = 8 - 1 = 7$, so $t_\alpha = 1.895$

Stat → Tests → t-Test ⇒



$\mu > 55$

$t_c = 2.243$

$p = 0.033$

$\bar{x} = 59.43$

$s = 5.22$

$n = 7$

Since t_c is in the rejection region and $p < \alpha$, we reject the null hypothesis at a significance level of .05. The data supports the educators claim at an observed significance level of 0.033.