§8.4 Test of Hypothesis about a population Mean: z-stat

We really allready covered this. To summarize:

μ_0 - the status quo

$z_c = \dfrac{\bar{x} - \mu_0}{\sigma_{\bar{x}}} = \dfrac{\bar{x} - \mu_0}{\sigma/\sqrt{n}} \approx \dfrac{\bar{x} - \mu_0}{s/\sqrt{n}}$ - the test statistic generated by the sample

α - significance level, Propability of a Type I error.

~~z_c - critical value for the Test. One-tailed: $z_c = z_\alpha$, two-tailed: $z_c = z_{\alpha/2}$.~~

p - observed significance level, generated by the sample.

	One-tailed Tests		two-tailed
	$H_0: \mu = \mu_0$	$H_0: \mu = \mu_0$	$H_0: \mu = \mu_0$
	$H_a: \mu < \mu_0$	$H_a: \mu > \mu_0$	$H_a: \mu \neq \mu_0$
rejection region	$z_c < -z_\alpha$	$z_c > z_\alpha$	$\lvert z_c \rvert > z_{\alpha/2}$
p-value	$P(z < z_c)$	$P(z > z_c)$	$2P(z > \lvert z_c \rvert)$

reject H_0: $p < \alpha$ or z_c in rejection region.

Possible conclusions from the Test:

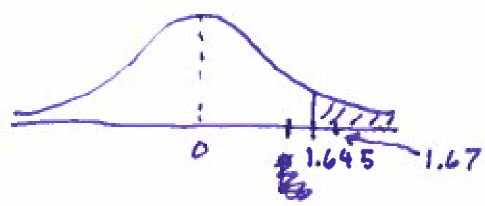
(1) Reject H_0. The data supports H_a. State you are rejecting H_0 at the α level of significance.

(2) Fail to reject H_0 at the α level of significance. The data does not support rejecting H_0.

Example Suppose $\sigma = 60$ and a sample of 100 observations yields $\bar{x} = 110$. Test $H_o: \mu = 100$, $H_a: \mu > 100$ with $\alpha = .05$.

$Z_\alpha = 1.645$, Stat -> Tests -> z-test yields

$\mu > 100$
$Z_c = 1.67$
$P = 0.0478$
$\bar{x} = 110$
$n = 100$



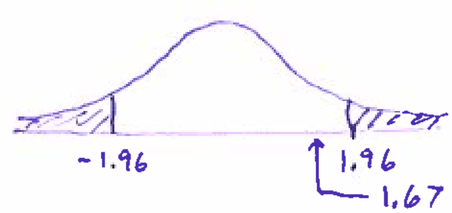
$Z_c > Z_\alpha$ and $p < \alpha$ so

Reject H_o at the .05 significance level (observed significance leve was 0.0478). The data supports H_a.

Example Suppos $\sigma = 60$ and a sample of 100 observations yields $\bar{x} = 110$. Test $H_o: \mu = 100$, $H_a: \mu \neq 100$ with $\alpha = .05$.

$Z_{\alpha/2} = 1.960$, stat -> tests -> z-test yields

$\mu \neq 100$
$Z_c = 1.67$
$P = 0.0956$
$\bar{x} = 110$
$n = 100$



$|Z_c| < Z_{\alpha/2}$ (Z_c is not in rejection region) and $p > \alpha$.

Fail to reject H_o at a .05 significance level, the data does not support rejecting H_o.