

## Hypothesis Testing Rejection Criteria

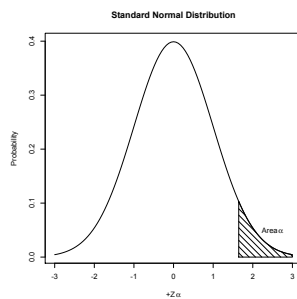
The driving force for rejecting the null hypothesis ( $H_0$ ) is the sign of the alternative hypothesis ( $H_a$ ). The null represents no changes, no interactions, no differences, no effect, etc. while the alternative represents some form of a change, whether it be less than (<), greater than (>) or even an unspecified direction of difference ( $\neq$ ). Both of the approaches here are still being driven by the sign of the alternative hypothesis.

1. Critical Value approach; the null hypothesis can be rejected under the following conditions:

- a. When  $H_a: >$

The null hypothesis can be rejected if and only if (iff):

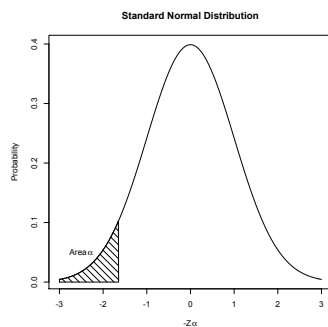
$z_{calc} \geq z_\alpha$  where  $z_\alpha$  is the z-score associated with RIGHT tail area  $\alpha$ ;  $z_\alpha$  will be a positive number.



- b. When  $H_a: <$

The null hypothesis can be rejected if and only if (iff):

$z_{calc} \leq z_\alpha$  where  $z_\alpha$  is the z-score associated with LEFT tail area  $\alpha$ ;  $z_\alpha$  will be a negative number.

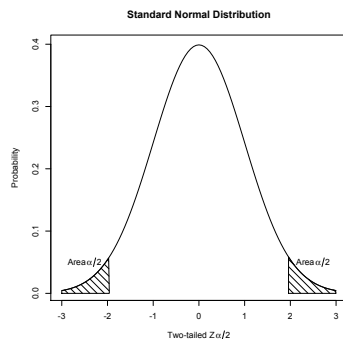


When using the t distribution, you have to assume that the t-value will be negative.

c. When  $H_a: \neq$

The null hypothesis can be rejected if and only if (iff):

$|z_{calc}| \geq |z_{\alpha/2}|$  where  $z_{\alpha/2}$  is the z-score associated with LEFT OR RIGHT tail area  $\alpha/2$ ;  $z_{\alpha/2}$  will be either a negative or a positive number.



Note: These work when substituting t for z.

2. The pvalue approach; the null hypothesis can be rejected iff  $pvalue \leq \alpha$ . This doesn't change, regardless of the sign of the alternative hypothesis. However, the calculation of the pvalue is dependent on the sign of the alternative hypothesis.

a. When  $H_a: >$

$$pvalue = P(Z > z_{calc}) = 1 - P(Z < z_{calc})$$

b. When  $H_a: <$

$$pvalue = P(Z < z_{calc})$$

c.  $H_a: \neq$

i. If  $z_{calc} > 0$ ,  $pvalue = 2P(Z > z_{calc}) = 2[1 - P(Z < z_{calc})]$

ii. If  $z_{calc} < 0$ ,  $pvalue = 2P(Z < z_{calc})$

Once you calculate your pvalue, the null hypothesis can be rejected iff  $pvalue \leq \alpha$

The pvalue calculations stated here won't work in quite the same way with the t distribution table.