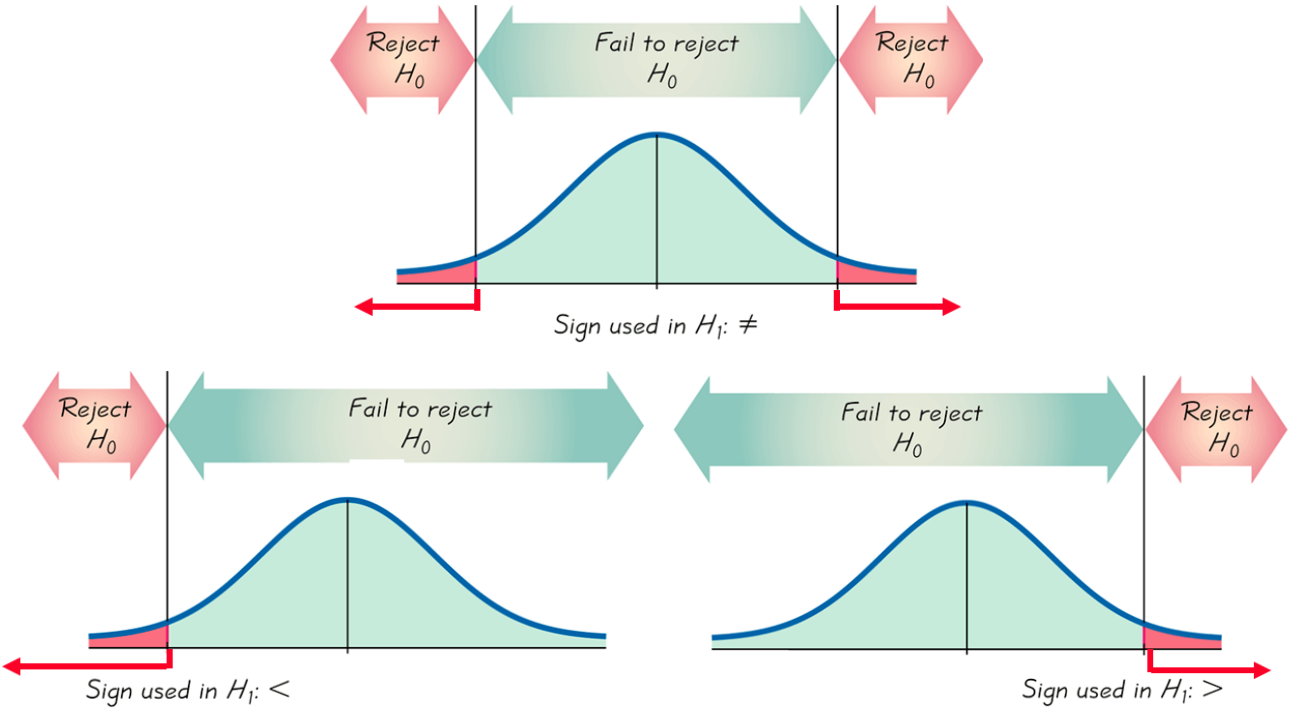
Hypothesis testing is a procedure, based on sample evidence and probability, used to test statements regarding a characteristic of one or more populations.

Null Hypothesis: The ***null hypothesis***, denoted H_0, is a statement to be tested. The null hypothesis is a statement of no change, no effect or no difference and is assumed true until evidence indicates otherwise.

Alternative Hypothesis: The ***alternative hypothesis***, denoted H_1, is a statement that we are trying to find evidence to support.

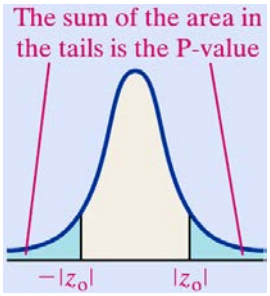
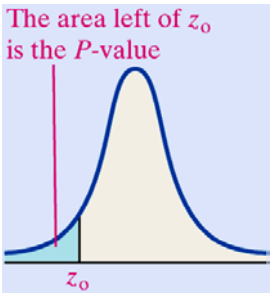
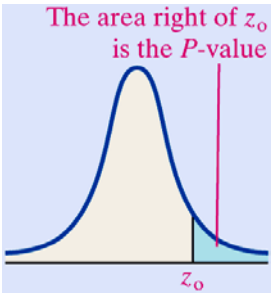
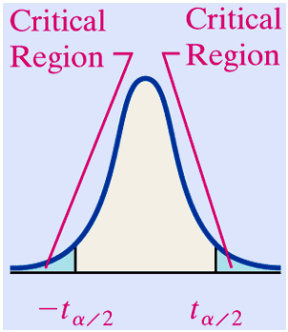
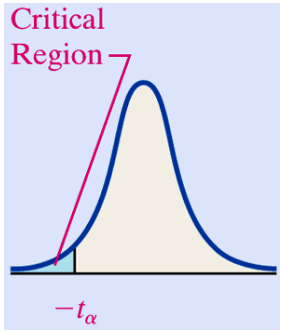
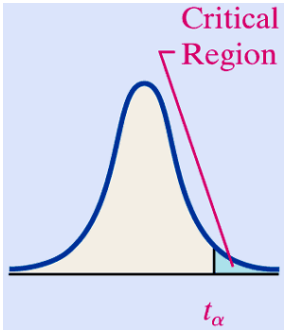
Three ways to set up the null and alternative hypotheses

1. Equal versus not equal hypothesis (two-tailed test)
   H_0: parameter = some value
   H_1: parameter ≠ some value
2. Equal versus less than (left-tailed test)
   H_0: parameter = some value
   H_1: parameter < some value
3. Equal versus greater than (right-tailed test)
   H_0: parameter = some value
   H_1: parameter > some value



*If **P-value** < **α**, reject the null hypothesis*

If P-value > α, ***fail to reject*** H_0.

Two–Tailed	*Left–Tailed*	*Right–Tailed*
$H_1 : p \neq p_0$	$H_1 : p < p_0$	$H_1 : p > p_0$
$z_0 < -z_{\alpha/2}$ or $z_0 > z_{\alpha/2}$ ***Reject the null hypothesis*** 	$z_0 < -z_{\alpha}$ ***Reject the null hypothesis*** 	$z_0 > z_{\alpha}$ ***Reject the null hypothesis*** 
$H_1 : \mu \neq \mu_0$	$H_1 : \mu < \mu_0$	$H_1 : \mu > \mu_0$
$t_0 < -t_{\alpha/2}$ or $t_0 > t_{\alpha/2}$ ***Reject the null hypothesis*** 	$t_0 < -t_{\alpha}$ ***Reject the null hypothesis*** 	$t_0 > t_{\alpha}$ ***Reject the null hypothesis*** 
$H_1 : \sigma \neq \sigma_0$	$H_1 : \sigma < \sigma_0$	$H_1 : \sigma > \sigma_0$
$\chi_0^2 < \chi_{1-\alpha/2}^2$ or $\chi_0^2 > \chi_{\alpha/2}^2$ ***Reject the null hypothesis***	$\chi_0^2 < \chi_{1-\alpha/2}^2$ ***Reject the null hypothesis***	$\chi_0^2 > \chi_{\alpha/2}^2$ ***Reject the null hypothesis***