

# Hypothesis Testing

$H_0$ : null hypothesis

$H_a$ : alternative hypothesis

**Only possible pairs** for claim parameter is  $k$ , population parameter is  $\mu$

$H_0: \mu = k$

$H_0: \mu \leq k$

$H_0: \mu \geq k$

$H_a: \mu \neq k$

$H_a: \mu > k$

$H_a: \mu < k$

## Writing hypothesis

Verbal Statement $H_0$ This mean is..	Mathematical Statements	Verbal Statement $H_a$ The mean is...
...greater than or equal to $k$ ...at least $k$ . ...not less than $k$ .	$H_0: \mu \geq k$ $H_a: \mu < k$	...less than $k$ . ...below $k$ . ...fewer than $k$ .
...less than or equal to $k$ . ...at most $k$ . ...not more than $k$ .	$H_0: \mu \leq k$ $H_a: \mu > k$	...greater than $k$ . ...above $k$ . ...more than $k$ .
...equal to $k$ . ... $k$ . ...exactly $k$ .	$H_0: \mu = k$ $H_a: \mu \neq k$	...not equal to $k$ . ...different from $k$ . ...not $k$ .

Similar statements can be made to test other population parameters such as  $p$ ,  $\sigma$ , or  $\sigma^2$ .

## Making a Decision

### Using P-value

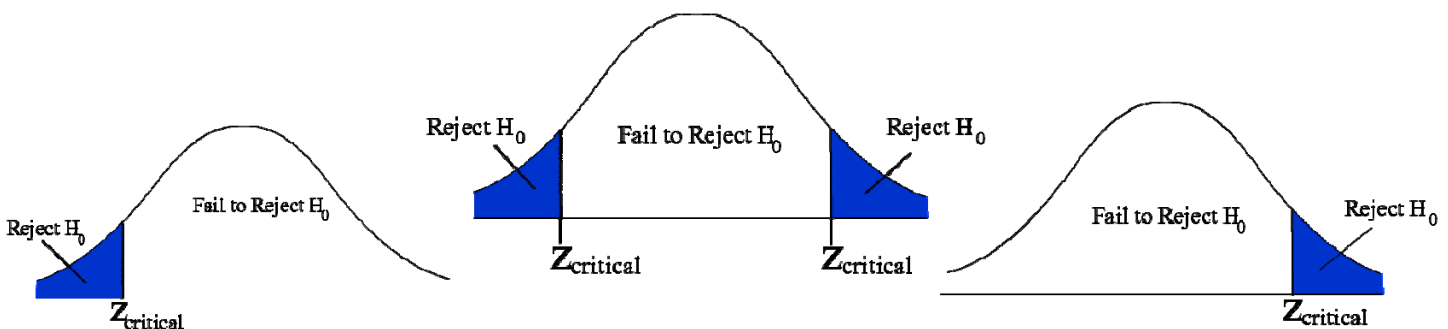
To use a P-value to make a conclusion in a hypothesis test, compare the P-value with  $\alpha$

If  $P \leq \alpha$ , then Reject  $H_0$ .

If  $P > \alpha$ , then Fail to Reject  $H_0$ .

### Critical Region and Critical Values

Determine if the problem is a normal distribution ( $z$ ),  $t$ -distribution, or proportion and follow that test statistic formula (normal distribution is show, all follow the same regions). Plot test statistic to determine the rejection region.



## Interpret the Decision

Decision	Claim	
	Claim is $H_0$	Claim is $H_a$
Reject $H_0$	There is enough evidence to reject the claim.	There is enough evidence to support the claim
Fail to Reject $H_0$	There is not enough evidence to reject the claim.	There is not enough evidence to support the claim.

You will find lots of examples in your book, or try these worksheets:

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<http://faculty.salisbury.edu/~dccathcart/MATH155/ClassSessions/hypothtestreview.pdf>

Dr. Rachael M. Welder

[http://www.rachaelwelder.com/files/stat-216/Worksheet\\_6\\_2\\_key.pdf](http://www.rachaelwelder.com/files/stat-216/Worksheet_6_2_key.pdf)

How to use the calculator:

**Hypothesis Testing on the TI-83/84**

Written by Jeff O'Connell, Ohlone College

<http://www2.ohlone.edu/people2/joconnell/ti/hyp8384.pdf>