# Intro to Hypothesis Testing: Test Statistics

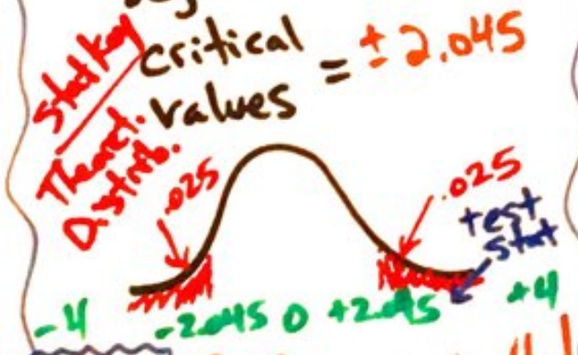
**Def: Hypothesis Test**
A procedure for testing a claim about a population

| Confidence Levels $1-\alpha$ | Significance (Alpha) Levels $\alpha$ |
|---|---|
| 0.90 | 0.10 |
| 0.95 (most common) | 0.05 |
| 0.99 | 0.01 |

**Def: Null Hypothesis**
A statement about the population that involves equality, no change, no effect or no relationship $H_0$

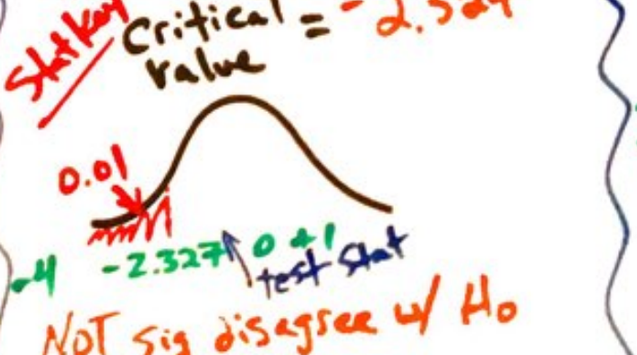
**Def: Test Statistic**
A number calculated to determine if Sample data (Sample Statistic) Significantly disagrees with Null hypothesis $H_0$.

**Ex 1** Two-Tailed T-test
T-test stat = +2.571
Sig Level: $\alpha = 0.05$
degrees freedom = 29
Critical values = $\pm 2.045$




Sig Disagree w/ $H_0$!

**Ex 2**: Left Tailed
z-test stat = -1.173
Sig Level $\alpha = 0.01$
Critical value = -2.327




NOT sig disagree w/ $H_0$

**Common Test Statistics**
- Z: # Standard errors for 1 or 2-pop proportion
- T: # Standard errors for 1 or 2-pop mean Ave or correlation
- $\chi^2$: Goodness of Fit Categorical Association
- F: ANOVA

**Tail Rule**
If the test statistic falls in a tail determined by the critical value and significance level then the Sample data Significantly disagrees with the Null Hypothesis

Sampling Variability "Random Chance" ⇒ Random Sample Stats will usually disagree with $H_0$, even if $H_0$ was correct!

**Ex 3**: Right Tailed
$\chi^2$ test Stat = +11.328
df = 4 sig level
C.V. = 7.779 $\alpha = 0.10$