

**Hypothesis Testing**

Make inferences about a population based on a sample

Example: Average GPA of undergraduate students at ASU

Population consists of all 10,000 undergraduate students

Randomly select 200 students

Compute their GPA (3.12)

Infer that the average GPA of all students is 3.12

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Is our inference accurate?

How confident are we that our inference is correct?

- 100%?
- 95%?
- 90%?
- 50%?

**Generally, in education we perform a statistical test to be 95% confident that our "answer" is correct.**

Hypothesis Testing:

**NULL HYPOTHESIS:**

a statement of *no difference* or *no relationship*

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$H_0$ : There is no difference in science scores of 8<sup>th</sup> students in School A and School B.

Set our confidence level at 95%

Level of significance = 100% - confidence level  
 = 5%  
 = .05

Alpha = .05

Z values between +1.96 and -1.96 enclose 95% of the area under the normal curve, hence a calculated z value greater than +1.96 and less than -1.96 would cause us to reject the null hypothesis.

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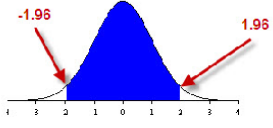
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Normal Distribution



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hence a calculated z value greater than +1.96 and less than -1.96 would cause us to reject the null hypothesis.

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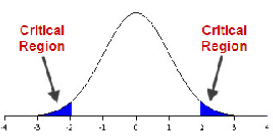
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Normal Distribution



If our calculated test statistic falls into the Critical Region we REJECT the null hypothesis.

If our calculated test statistic does not fall in the Critical Region we FAIL TO REJECT the null hypothesis.

**Note:** *do not accept the null, only fail to reject*

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Assume we know the average GPA of all students at ASU is 3.12 with a standard deviation of .16. We randomly sample 200 students and find their average GPA to be 3.09. Is the sample representative of the population?

**Null Hypothesis:** There is no difference between the GPAs of the population and the sample.

Confidence Level: 95%

Critical Regions:  $>+1.96$  and  $<-1.96$

Compute the z statistic and get  $z = -2.65$

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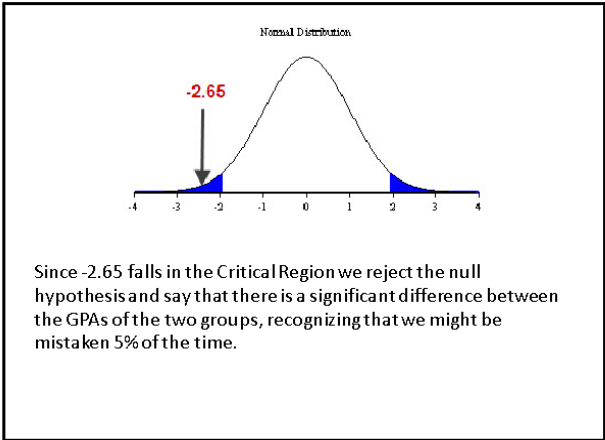
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