

April 6, 2011
It is E370 Time!!!

☐ Announcements

- ✓ Information for the exam on Saturday has been emailed to you all.
- ✓ Note that UGIs will not hold their regularly scheduled library hours this week. Instead they will all be on the 4th floor of the library, Friday, 4/8, from 6:30 to 9:30 PM.
- ✓ Peer tutors will have their review session Wednesday, 4/6, at 8:00 PM in BH308.
- ✓ Manuel Gonzalez will hold a review session Friday, 4/8 in BH310, from 6:00 to 8:00 PM.

A question to get you thinking:

Age of a sample of World Billionaires in 2010			
Mean	61.75	=NORMSINV(0.94) 1.55	=TINV(0.06,63) 1.92
Mode	64	=NORMSINV(0.97) 1.88	=TINV(0.03,63) 2.22
St. Dev.	12.76		
Minimum	36	Calculate a 97% confidence interval for the mean age of all 2010 world billionaires.	
Maximum	90		
Sum	3952		
Count			

☐ And one more

The amount of time it takes to complete an examination has a left-skewed distribution with a mean of 65 minutes and a standard deviation of 8 minutes. The probability that a random sample of 64 students exceeded 73 minutes on average is (approximately) ?

- What will we do today?
 - ✓ Practice some problem exam questions.
 - ✓ Consider the anatomy of hypotheses.
 - ✓ Practice writing hypotheses.
 - ✓ Learn the language of hypothesis tests.
 - ✓ Dissect a hypothesis test.

- Hypothesis Testing
 - ✓ State a claim or assumption.
 - ✓ Draw a sample for evidence.
 - ✓ Use the distribution of the statistic to judge if the claim is too far away from your evidence to be believable.

- An analogy:
 - ✓ US Criminal Courts assume a defendant is innocent.
 - ✓ The trial presents evidence on which basis jurors decide the truth of the assumption.

- Anatomy of Hypotheses
 - ✓ They come in pairs.
 - ✧ Null
 - ✧ Alternative
 - ✓ The null is always that nothing besides randomness is influencing the situation, while the alternative is that something other than randomness is influencing the situation.
 - ✓ The null always includes the comparison value or circumstance and the alternative includes whatever the null does not.

- ✓ Each is constructed of a parameter, a value and a sign that indicates the relationship between the parameter and the value.
- Based on the sign in the null, two types of tests are distinguished.
 - ✓ H_0 includes "="
 - ✧ a simple null
 - ✧ a two-tailed test
 - ✓ H_0 includes " \geq " or " \leq "
 - ✧ a composite null
 - ✧ a one-tailed test
 - ✓ If H_0 includes " \geq " then H_1 includes "<"
 - ✧ a "left-tailed test"
 - ✓ If H_0 includes " \leq " then H_1 includes ">"
 - ✧ a "right-tailed test"
- Joe's Television Repair and Tattoo Parlour claims that no more than 10% of the TVs repaired there have to come back for additional work.

H_0 :

H_1 :

- Joe, of Joe's Television Repair and Tattoo Parlour, has read that the average tattoo in the U.S. costs the consumer \$89 with a standard deviation of \$7. Joe wonders if he is undercharging his customers.

H_0 :

H_1 :

- Joe was chatting with a customer one day, who told him that the average age of a penny in circulation in the US was 9.8 years. Joe was inspired to test the truth of this claim.

H_0 :

H_1 :

- Researchers looked at IQs of a sample of people who claimed to have had an intense experience with an Unidentified Flying Object (UFO). IQs are a normally distributed random variable centered at 100. Is the mean IQ of the UFO group different from that of the general population?

H_0 :

H_1 :

- A campus legend tells a story about two friends who lied to their professor by blaming a flat tire for their having missed an exam. The professor sent them to separate rooms with the makeup exam which was one question: Which tire was flat?

- ✓ A study revealed that people choose the right front tire more often than another tire when asked to say which tire is likely to have gone flat. How would you test this?

H_0 :

H_1 :

- More Language of Hypothesis Tests
 - ✓ Standardized and Unstandardized Tests
 - ✓ Test Statistics
 - ✧ Z_{OBS}
 - ✧ t_{OBS}
 - ✓ Rejection Region(s)
 - ✓ Non-Rejection Region
 - ✓ Decision Rules
 - ✓ Reject and Fail to Reject
 - ✓ Critical Value(s)
 - ✓ Level of Significance
 - ✓ p-value

□ A Hypothesis Test

- ✓ 50% of citizens eligible for jury duty in the South between 1960 and 1980 were African American.
- ✓ On an 80-person panel of possible jurors, only 4 were African American.
- ✓ Could this just be the luck of the draw? a result of pure chance?

□ Let's think it through-

- ✓ Assume juror selection was RANDOM. If it was random we would expect 50% of jurors to be African American.
- ✓ H_0 :
- H_1 :
- ✓ Select a level of significance.
- ✓ The distribution of the race of the jurors is a binomial, so we will use the sample proportion to perform our test and calculate probabilities, if appropriate.
- ✓ The Binomial parameters are 80 and 0.50, so . . .

◇ $E(p) = 0.50$

◇ $\sigma_p = \sqrt{\frac{0.5 * 0.5}{80}} = 0.0559$

✓ Calculate critical value(s)

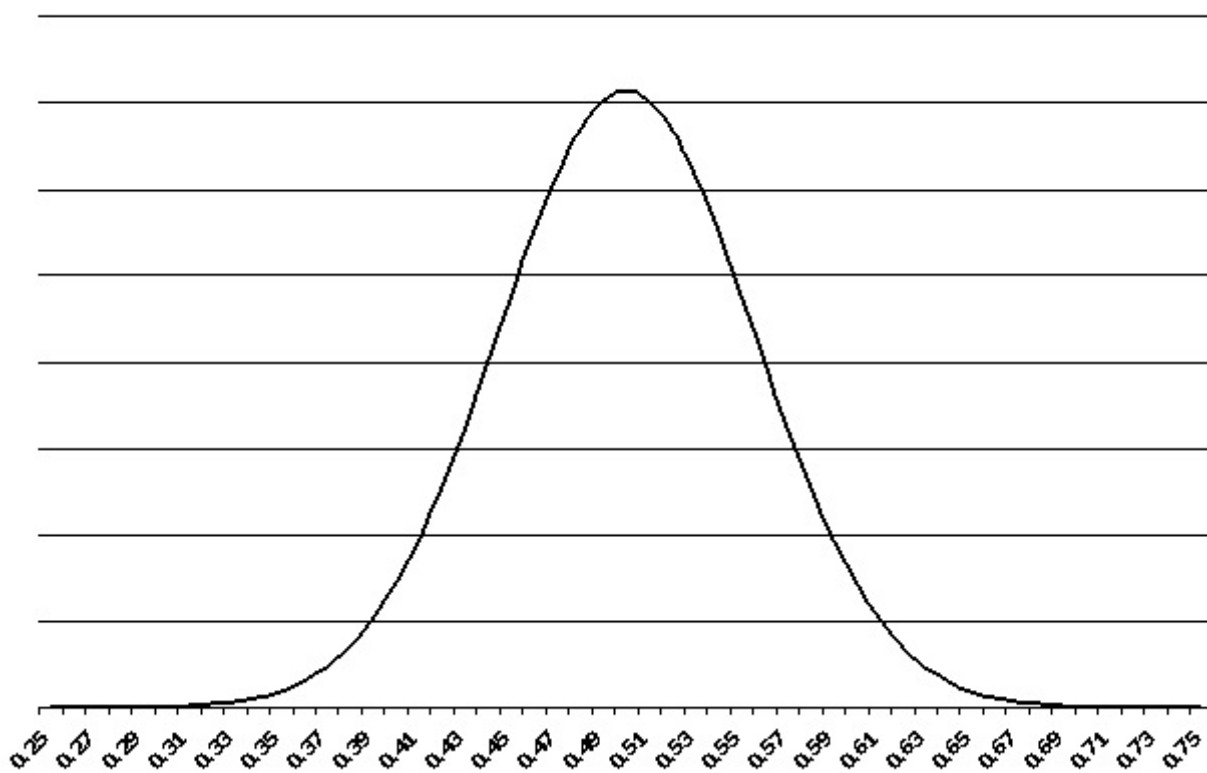
✓ Write the decision rule.

- ✓ Calculate the standardized test statistic.

$$\diamond p = \frac{4}{80} = 0.05 \text{ so}$$

- ✓ Perform the test.

Distribution of Proportion of Jurors who are African American



- ✓ How unlikely was this?

- ✓ The area to the left of 0.05 can be calculated as
 - ✧ =NORMSDIST(-8.05009)

 - ✧ =0.0000000000000000414

- ✓ Just how small is this number?