

### III.1) Significance Tests: The Basics (Day 1)

Case Study pg. 685

$$\bar{x} = 321.03 \quad s_x = 3.03$$

Pizza Delivery - A pizza company claims they average no more than 20 minutes to deliver a pizza from the time the order is received. How would you design a study to test the claim? What constitutes evidence they are wrong? Sample average 22 minutes? 25? 35? At what point do you have sufficient evidence?

\* Makes more sense to gather evidence against a hypothesis than in favor of one.

Time Permitting

#### Activity 11A Pick a Card

Example 11.2  $\mu = 6.7$  minutes  $\sigma = 2$  min

$$SRS = 400 \quad \bar{x} (\text{sample}) = 6.48$$

$$s_{\bar{x}} = \frac{2}{\sqrt{400}} = .10 \text{ minutes (graphic pg. 690)}$$

#### HW III. 1) Student attitudes

SSHA scores range from 0 to 200

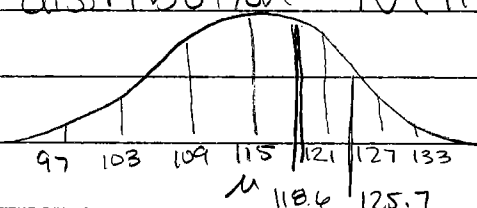
$$\mu = 115 \quad \sigma = 30$$

sample = 25 assume normality and  $\sigma = 30$

(a)  $\mu$  = the mean score for all older students  
 $\alpha$  = this college

$$(b) \mu = 115 \quad \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{30}{\sqrt{25}} = 6$$

Sampling distribution  $N(115, 6)$



$$(c) \bar{X} = 118.6 \quad \text{and} \quad \bar{X} = 125.7$$

Assuming  $H_0$  is true, observing a mean of 118.6 or higher would not be surprising. A mean of 125.7 is less likely and provides more evidence against  $H_0$ .

(d) Yes. The sample size of 25 was not large enough to use the CLT for  $N$ .

(e) No. These students may not be representative of all U.S. college students.

Null hypothesis - statement being tested; "status quo" hypothesis;

( $H_0$ ) Suggests no change or no difference.

Significance test is designed to assess the strength of the evidence against the null hypothesis.

alternative hypothesis - suggests that something has

( $H_a$ ) changed or is different than expected.

Example 11.2

$H_0$  claims no decrease in response times

$H_a$  claims there is a decrease

$$H_0: \mu \geq 6.7 \text{ minutes}$$

$$H_a: \mu < 6.7 \text{ minutes}$$

one-sided alternative hypothesis; interested only in deviation from  $H_0$  in one direction

### 11.1 continued

two-sided alternative hypothesis would

mean we use  $H_0 = \mu = \mu_0$   $H_a \neq \mu_0$

Above or below the  $H_0$  would reject the  $H_0$  and accept  $H_a$

(Discuss 11.3 - two-sided; notation)

\* Hypotheses always refer to some population, not to a particular outcome. State the hypotheses in terms of parameter ( $\mu$  or  $p$ ) not the sample statistics ( $\hat{\mu}$  or  $\bar{x}$ )

HW 11.3 (a)  $H_0: \mu = 115$   $H_a: \mu > 115$

(b)  $H_0: \mu = 12$   $H_a: \mu < 12$

11.4 (a)  $\mu$  = mean gas mileage for Larry's car on the highway

$H_0: \mu = 26$  mpg  $H_a: \mu > 26$  mpg

(b)  $p$  = the proportion of teens in your school who rarely or never fight with their friends

$H_0: p = .72$   $H_a: p \neq .72$

open book?

11.6 (a)  $H_0$  should be a statement of no change

(b)  $H_0$  should be about  $\mu$ , not  $\bar{x}$

(c) The hypothesis should be a claim about the population

