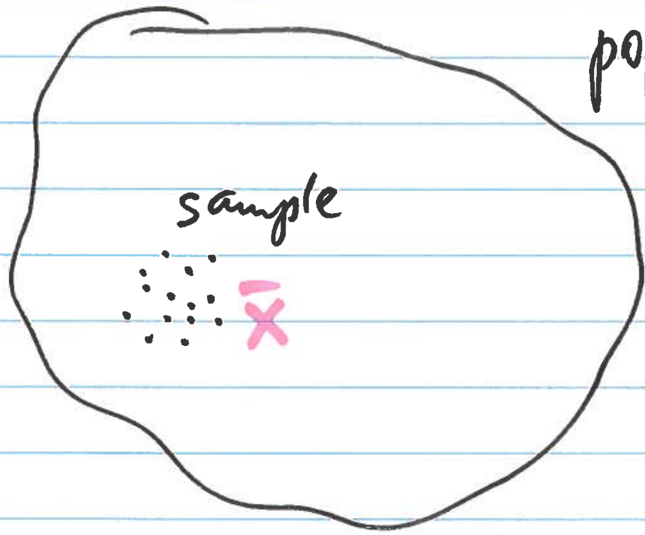
MBC 638
11/8/2017

HYPOTHESIS TESTING

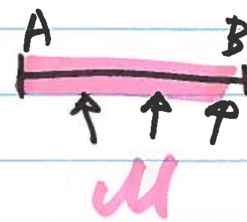
Confidence Interval for μ:



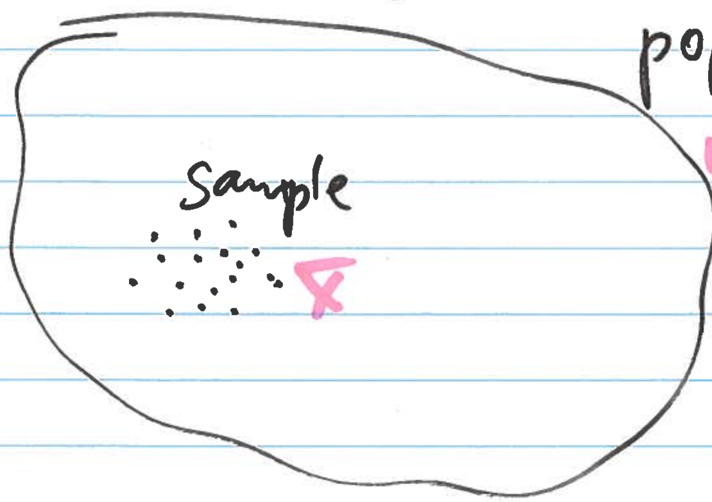
population

μ is unknown

Interval:



Hypothesis testing for μ:



population

μ is unknown

Hypothesis:

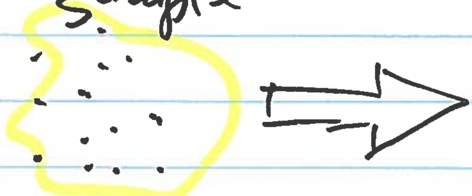
$\mu > 10$ TRUE

or $\mu < 15$

or $\mu \neq 11$ FALSE

Target: 4.8

RANDOM sample



$\bar{x} = 4.9$
$n = 80$
$\sigma = 0.3$

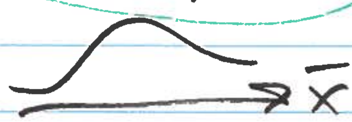
Hypothesis:

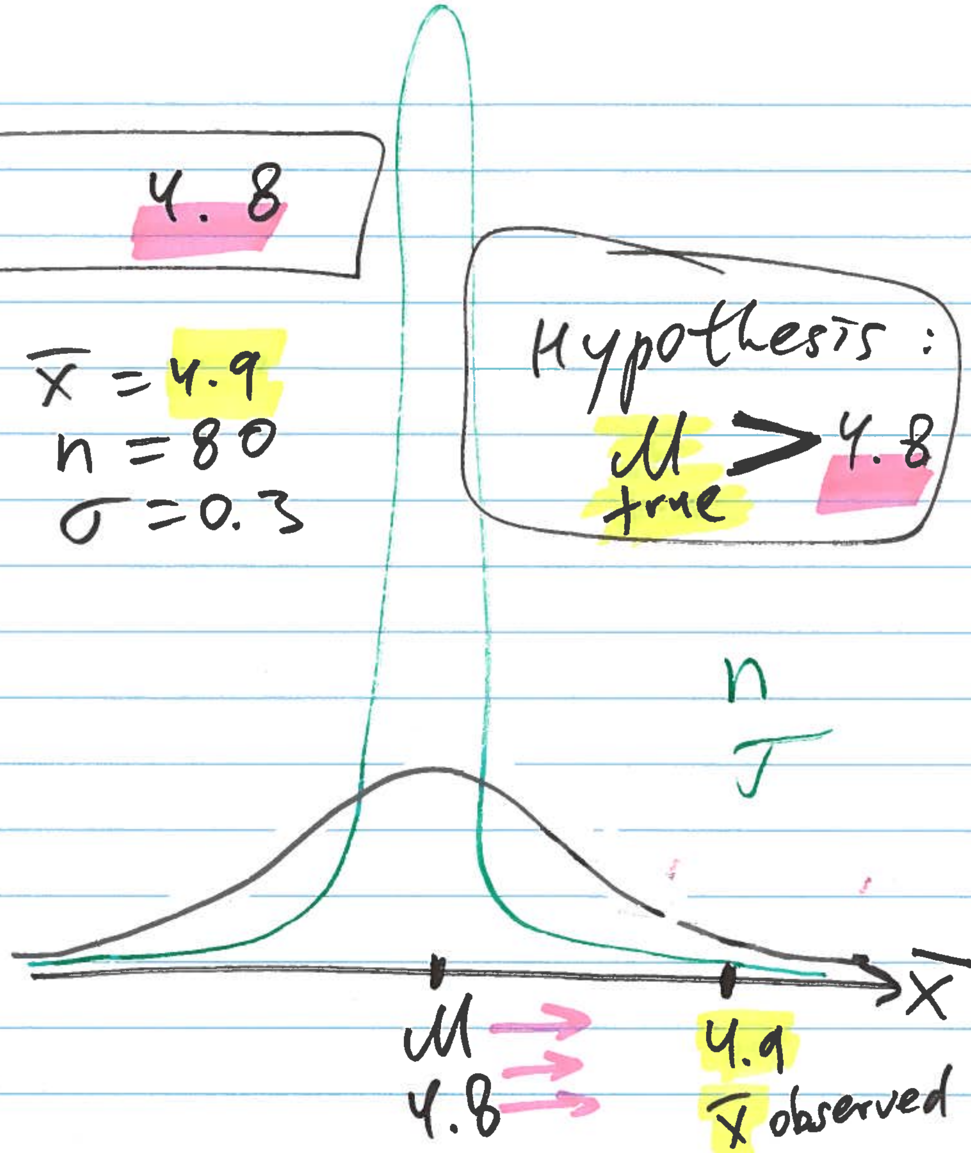
$\mu_{true} > 4.8$

CLT ($n \geq 30$):

$\mu_{\bar{x}} = \mu$

$\sigma_{\bar{x}} = \sigma / \sqrt{n}$





4.9 is an outlier relative to 4.8 if $z = \left| \frac{4.9 - 4.8}{0.3/\sqrt{80}} \right| > 3$

Slide 24

Nationally, $\boxed{\mu = 21.6}$

Santa Barbara: $n = 76 \geq 30$

$\bar{x} = 24.1$

$s = 4.8$

a) $\alpha = 0.05$

- ~~$H_0: \mu_{SB} \leq 21.6$~~

  $H_A: \mu_{SB} > 21.6$

- Test statistic:

"case ② σ unknown $n \geq 30$"

$$t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}} = \frac{24.1 - 21.6}{4.8/\sqrt{76}} = 4.5$$

- p-value:

$$\text{pvalue} = P(t > 4.5) = 0.000011$$

if it was z:
$P(z > 4.5)$
$= 1 - \text{norm.dist}(4.5, 0, 1, 1)$

$= 1 - \text{t.dist}(4.5, 75, 1)$

- Compare pvalue with α:

$$\alpha = 0.05 > \text{pvalue} = 0.000011$$

Reject Ho. Yes, we do have evidence that the overall average milk consumption in SB is higher than 21.6.

b) • $H_0: \mu_{SB} = 21.6$ $\quad H_A: \mu_{SB} \neq 21.6$

• $\text{pvalue} = 2 \cdot P(t > |4.5|) = 2 \cdot 0.000011 = 0.000022$

Reject Ho.

Yes . . . . different . . . . .

c) 95% C.I. for μ_{SB}:

$$\bar{X} \pm t_{\alpha/2} \cdot \frac{s}{\sqrt{n}}$$

21.6. [23.00 , 25.20]