

Lesson #19

Aim: Testing a claim about the mean:  $\mu$  Not Known

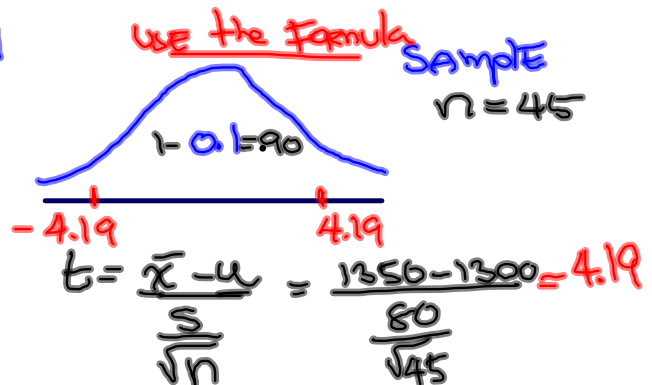
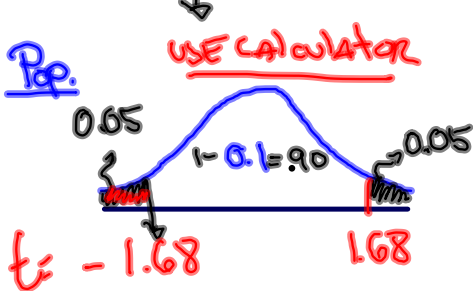
Problem: At the Foremost State Bank the  
 $H_0: \mu = 1300$  AVERAGE SAVINGS account balance in 2012 was \$1300.

$H_1: \mu \neq 1300$

A random sample of 45 savings account  
 $n=45$  balances for 2013 yielded a mean of \$1350  
 $\bar{x} = 1350$  with a standard deviation of \$80.

$s = 80$  At  $\alpha = 0.1$  significant level, can we conclude that the mean savings account balance in 2013 is different from the mean savings accounts from 2012

BASIC decisions  $\leftarrow$  t (value): why? ~~2~~,  $n=45$   
two tails, one tail (left / right)



testing (Methods)

1) CONFIDENCE INTERVAL  $\bar{x} - E < \mu < \bar{x} + E$

$$\bar{x} = 1350$$

$$E = t_{\frac{\alpha}{2}} \cdot \frac{s}{\sqrt{n}} = 1.68 \cdot \frac{80}{\sqrt{45}} = 20.04$$

$$1350 - 20.04 < \mu < 1350 + 20.04$$

$$1329.96 < \mu < 1370.04$$

Is my  $H_0$   $\mu$   
inside of interval?

So we reject  $H_0$

$$H_0: \mu = 1300$$

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1-Sample tInterval
Left = 1329.96209
Right = 1370.03791
x̄ = 1350
sx = 80
n = 45

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33. A researcher claims that the average wind speed in a certain city is 8 miles per hour. In a random sample of 32 days, the average wind speed is 8.2 miles per hour. The standard deviation of the sample is 0.6 miles per hour. At  $\alpha = 0.05$  is there enough evidence to reject the claim?

$$H_0: \mu = 8 \quad H_1: \mu \neq 8$$

$$\bar{x} - E < \mu < \bar{x} + E$$

$$8.2 - 0.22 < \mu < 8.2 + 0.22$$

$$E = 2.0395 \cdot \left( \frac{0.6}{\sqrt{32}} \right)$$

$$E = 0.22$$



$$n = 32$$

$$\bar{x} = 8.2$$

$$s = 0.6$$

$$\alpha = 0.05$$

$$t$$

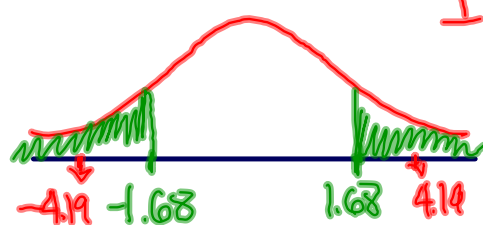
$$7.98 < \mu < 8.42$$

Is 8 inside?

yes

Do not reject  $H_0$

## 2) Traditional Method

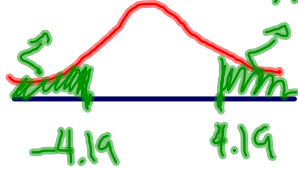


IS  $-4.19$  inside of the  
CRITICAL AREA? YES

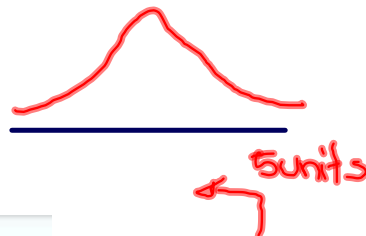
so we reject  $H_0$

### 3) P-value two tailed test

Area = 0.00006



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Lower =  $-\infty$   
 Upper = -4.19  
 $\bar{X} = 1350$   
 $S = 80$

Student-t, C.D  
 P = 6.6064E-05  
 t: Low = -1E+10  
 t: UP = -4.19

= 0.000066064

two tails:  $2(0.00006) = 0.00012$

COMPARE

$0.00012 < \alpha = 0.1$   
reject  $H_0$