

# Statistics

## Lecture 47



Feb 19-8:47 AM

The college claims that at most 25% of all female students are STEM majors.  $\rightarrow P \leq .25$

$H_0: P \leq .25$  claim

$H_1: P > .25$  RTT

In a sample of 175 female students, 28% of them were stem majors.

$n = 175 \Rightarrow X = n\hat{p} = 175(.28) = 49$   
 $\hat{p} = .28$  if decimal  $\rightarrow$  Round-up

Test the claim at  $\alpha = .02$ .

CV Z RTT

$H_0$  NCR .98  
 $H_1$  CR .02

$\mu = 0$   
 $\sigma = 1$

$Z = 2.054$

$Z = \text{invNorm}(.98, 0, 1) = 2.054$

CTS is in NCR  
P-value  $> \alpha$

$H_0$  valid  $\rightarrow$  valid claim  $\rightarrow$  FTR the claim  
 $H_1$  invalid

CTS  $Z = .917$   
P-value  $P = .180$

1-Prop Z Test  
 $P_0: .25$   $H_0$   
 $X: 49$   
 $n: 175$   
Prop  $> P_0$   $H_1$   
[Calculate]

Nov 25-8:49 AM

The College claims that mean Salaries of all teachers is at least \$65,000/yr.

$H_0: \mu \geq 65000$  **claim**

$H_1: \mu < 65000$  **LTT**

In a Survey of 40 teachers, their mean Salary was \$60,000/yr.

$n = 40$   
 $\bar{x} = 60000$

It is known that Standard Deviation of Salaries of all teachers is \$2500/yr.

$\sigma = 2500$

Use  $\alpha = .1$  to test the claim

$\sigma$  Known  
**CV Z  $\alpha = .1$  LTT**

CTS  $Z = -1.649$   
P-value  $P = 0$

**Z-Test**  
inpt:   
 $\mu_0 = 65000$   $H_0$   
 $\sigma = 2500$   
 $\bar{x} = 60000$   
 $n = 40$   
 $\mu < \mu_0$   $H_1$

$Z = \text{invNorm}(.1, 0, 1) = -1.282$

CTS is in CR.  
P-value  $\leq \alpha$

$H_0$  invalid  
 $H_1$  valid  
Invalid claim  $\rightarrow$  Reject the claim

Nov 25-9:02 AM

Score of 10 randomly selected exams are given below:

78 84 100 96 88  
70 65 79 90 80

Store in L1  
Find  $\bar{x}$  & S.  
Round to whole #  
 $\bar{x} = 83$   $S = 11$

Department claim the mean of all exams is 80. Test the claim  
No  $\alpha \rightarrow$  use .05

$H_0: \mu = 80$  **claim**

$H_1: \mu \neq 80$  **TTT**

$\sigma$  Unknown  
**CV t invT  $\alpha = .05$  TTT**

$df = n - 1 = 9$  **TTT**

CTS  $t = .862$   
P-value  $P = .411$

**T-Test**  
inpt   
 $\mu_0 = 80$   $H_0$   
 $\bar{x} = 83$   
 $S = 11$   
 $n = 10$   
 $\mu \neq \mu_0$   $H_1$

$t = \text{invT}(.975, 9) =$

CTS is in NCR  
P-value  $> \alpha$

$H_0$  Valid  
 $H_1$  invalid  
Valid claim  $\rightarrow$  FTR the claim

Nov 25-9:16 AM

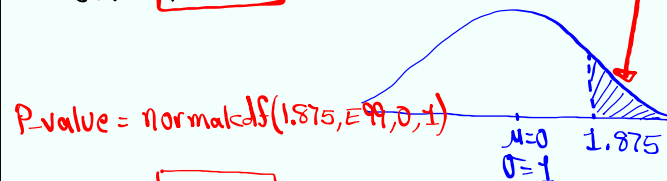
What is P-value?

P-value is the area of tail of the dist. graph marked by CTS.

only for TTT  $\Rightarrow$  Multiply by 2.

Ex: CTS  $Z = 1.875$  RTT

Find **P-value**



$$P\text{-value} = \text{normalcdf}(1.875, E99, 0, 1)$$

$$= \boxed{.030}$$

if it was TTT,

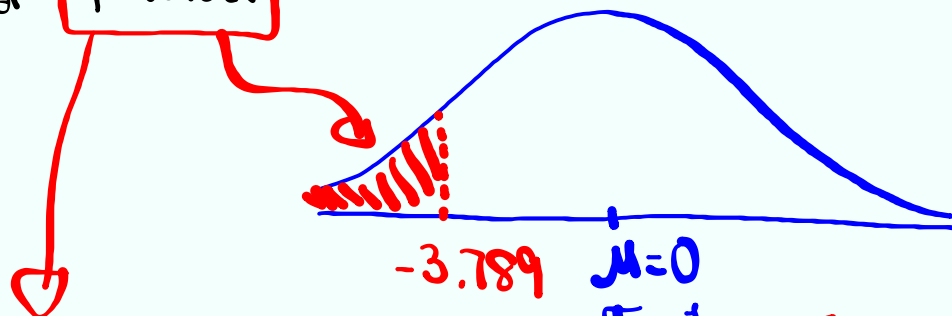
$$P\text{-value} = 2(.030)$$

$$= \boxed{.06}$$

Nov 25-9:31 AM

CTS  $Z = -3.789$  LTT

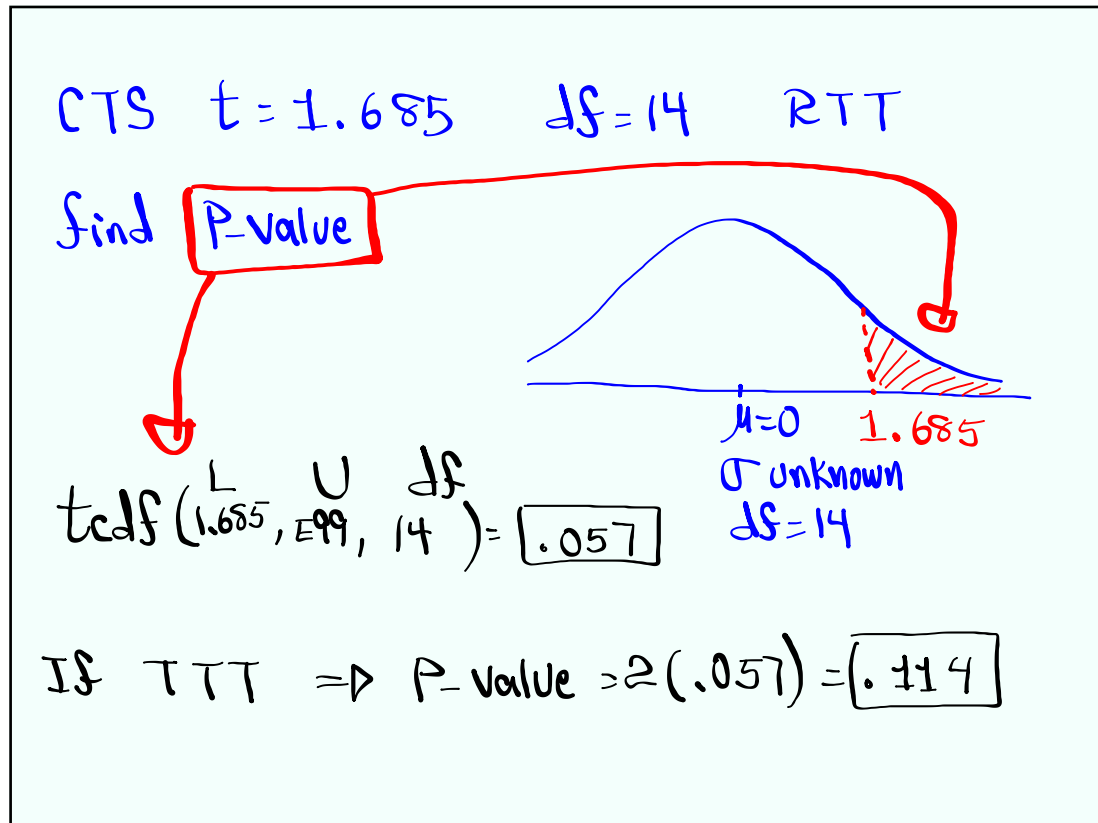
Find **P-value.**



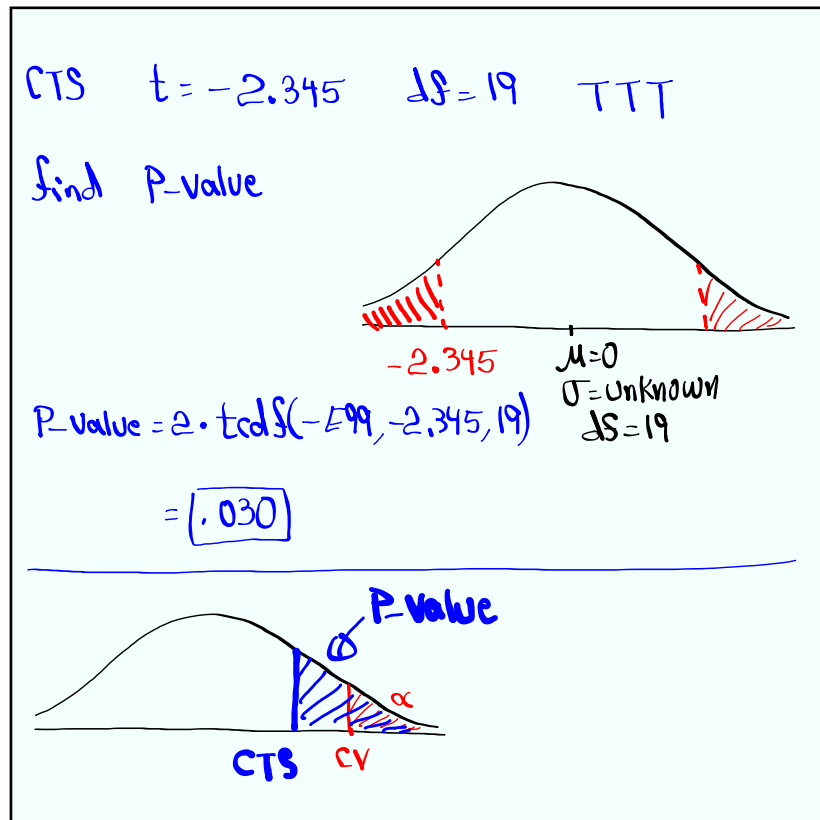
$$\text{normalcdf}(-E99, -3.789, 0, 1) = \boxed{7.6 \times 10^{-5}}$$

$$\text{If TTT} \Rightarrow P\text{-value} = 2(7.6 \times 10^{-5}) = \boxed{1.5 \times 10^{-4}}$$

Nov 25-9:36 AM



Nov 25-9:41 AM



Nov 25-9:45 AM