Statistics

Lecture 11

Feb 19-8:47 AM

SG 23

Testing claims:

claims are made about parameters.
Populations

our task is to test those claims for their validities.

If claim is valid → we support it.
Fail-to-Reject

If claim is invalid → we reject it.

Final Conclusion:

Reject the claim OR

Fail-to-reject the claim

May 8-8:05 AM

Claim could be about

1) Population Proportion
2) Population Mean
3) Population Standard deviation
4) ....

Testing Methods:

1) Traditional Method
2) P-Value Method
3) Confidence Interval Method

Regardless of the method, Final Conclusion must be the same.

Reject the claim (claim is invalid) OR FTR the claim (claim is valid)

May 8-8:10 AM

Testing Types:

1) Right-Tail Test RTT
2) Left-Tail Test LTT
3) Two-Tail Test TTT

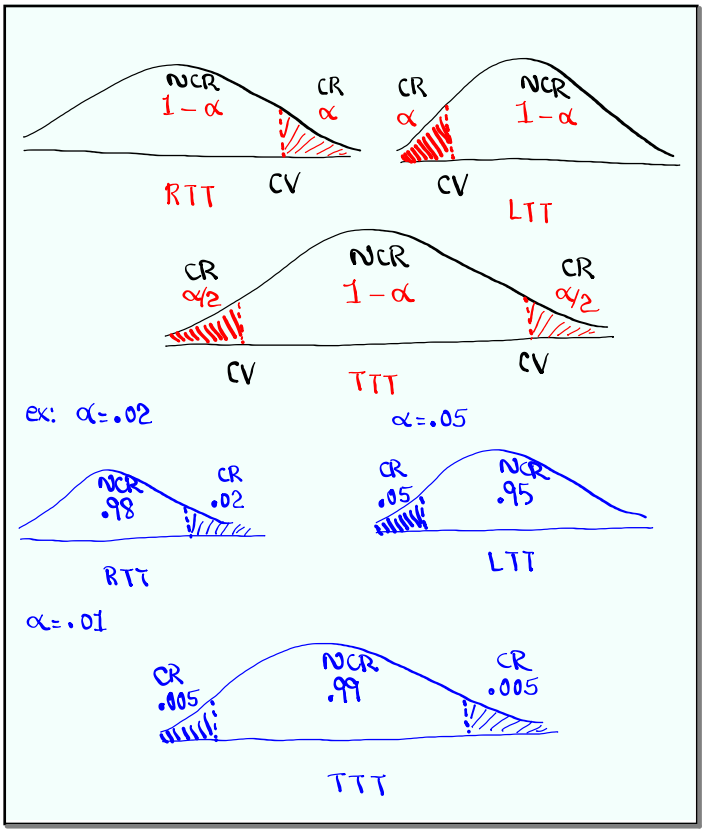
With every testing, we have a Significance level α

$0 < \alpha < 1$

α is the total area of tail or tails.

when α not given $\Rightarrow$ use .05

May 8-8:17 AM



May 8-8:21 AM

Testing Process:

1) Set-up H_0 and H_1. — Alternative Hypothesis. H_a

↑ Null Hypothesis

2) Find Critical Value(s)

Drawing, labeling, shading and Full TI Command required. Always round to 3-dec. Places.

3) Find Computed Test Statistic CTS and P-Value P.

Full TI Command or formula required.

4) Use **Testing Chart** to determine the validity of H_0 & H_1.

5) Draw Final Conclusion about the claim.

Reject the claim OR FTR the claim

May 8-8:27 AM

More on H_0 & H_1:

H_0 must contain the = Sign. $=, \geq, \leq$

H_1 Cannot contain the = Sign. $\neq, <, >$

H_1 tells us if it is RTT, LTT, or TTT.

H_1: $>$ RTT H_1: $<$ LTT H_1: $\neq$ TTT

Keywords for H_0:

is, equal, the same, not different, at least, at most, ...

Keywords for H_1:

is not, not equal, not the same, different, more than, less than, below, above, exceed, ...

May 8-8:36 AM

College claims that 10% of all students smoke.

$P = .1$ ← H_0

H_0: $P = .1$ claim

H_1: $P \neq .1$ TTT

College claims that the mean age of all students is below 32.5 yrs.

μ

$\mu < 32.5$ ← H_1

H_0: $\mu \geq 32.5$

H_1: $\mu < 32.5$ claim, LTT

May 8-8:42 AM

College claims that standard dev. of Salaries of all Faculties is at most $400.

σ

$\sigma \leq 400$ ← H_0

H_0: $\sigma \leq 400$ claim

H_1: $\sigma > 400$ RTT

Claim could be H_0 or H_1. Claim cannot be both at the same time.

Always identify the claim & Type of Testing

May 8-8:48 AM

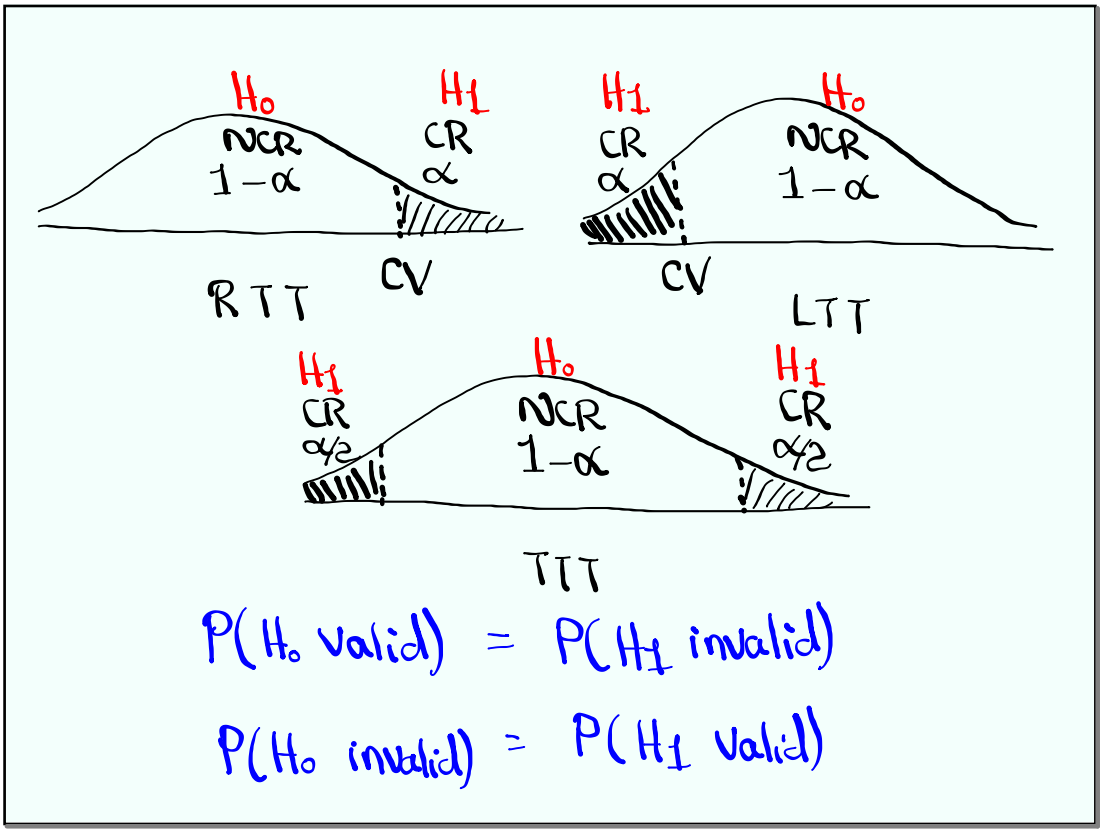
Possible errors for H_0:

Action \ Reality	H_0 valid	H_0 invalid
Support H_0 (FTR)	Good Decision	Type II error
Reject H_0	Type I error	Good Decision

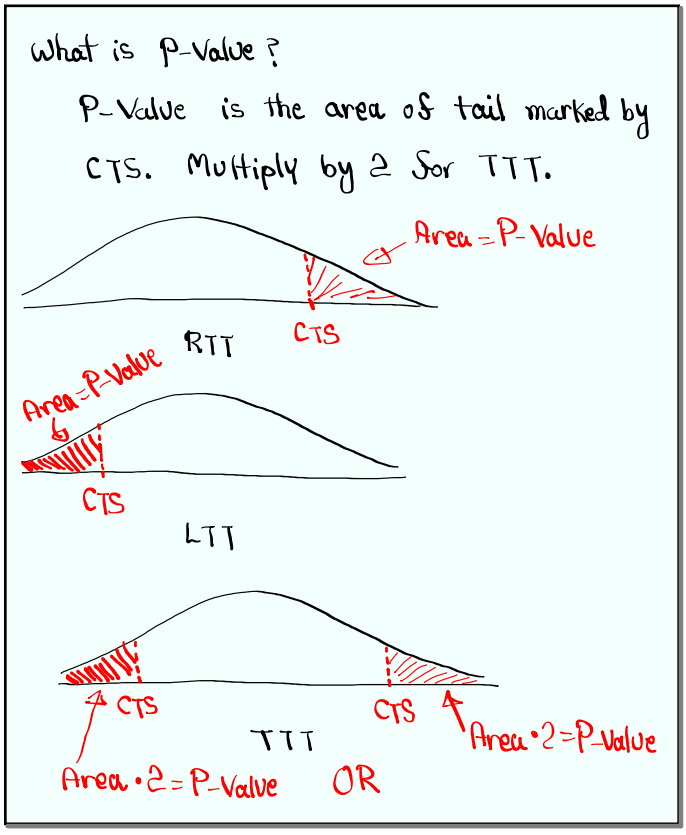
Type I error: we reject a valid H_0.

Type II error: we Support an invalid H_0

May 8-8:53 AM



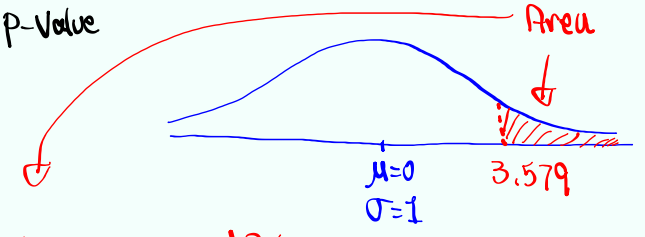
May 8-8:59 AM



May 8-9:04 AM

Given CTS $Z = 3.579$ RTT

Find p-value



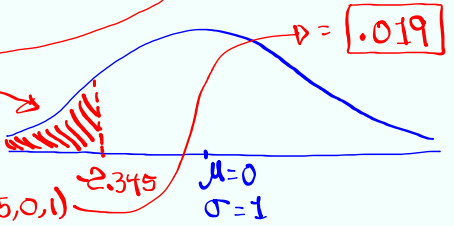
P-Value = normalcdf(3.579, E99, 0, 1)

$= 1.7 \times 10^{-4}$

Given CTS $Z = -2.345$ TTT

Find p-value.

P-Value = 2 • Area



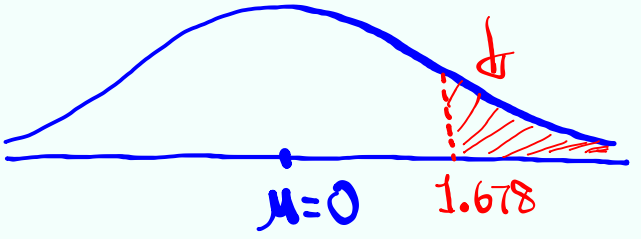
P-Value = 2 • normalcdf(-E99, -2.345, 0, 1)

May 8-9:09 AM

Given CTS $t = 1.678$ $df = 14$ TTT

Find p-value.

P-Value = 2 • Area



P-Value = 2 • tcdf(1.678, E99, 14)

$= .116$

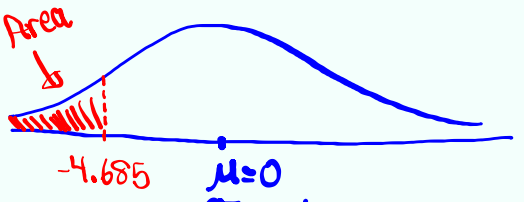
σ unknown

$df = 14$

May 8-9:15 AM

Given CTS $t = -4.685$ LTT $df = 19$

Find p-Value.



σ unknown
$df = 19$

P-Value = tcdf(−E99, −4.685, 19)

$= 8.1 \times 10^{-5}$

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