

Statistics

Spring 2023

Lecture 47



Feb 19-8:47 AM

Testing claims:

A claim could be about

a) Population Proportion P

b) Population Mean μ

c) Population standard deviation σ

ex: I claim 75% of LA residents are Lakers fan.

I claim the mean age of all students at college is below 30 yrs.

I claim the standard deviation of all exam score is at least 10.

SG 24-27

May 9-7:19 AM

Why are we testing claims?

We test claims simply to determine the validity of the claim.

If claim is valid \Rightarrow we support it.

If claim is invalid \Rightarrow we reject it.

Any possibilities to make a mistake? Yes

When we have a valid claim but we reject it.

When we have an invalid claim but we support it.

May 9-7:24 AM

Testing Methods:

1) Traditional Method

2) P-value Method

3) Confidence Interval Method

we use these two methods in the class.

Regardless of the method, the final conclusion must be the same.

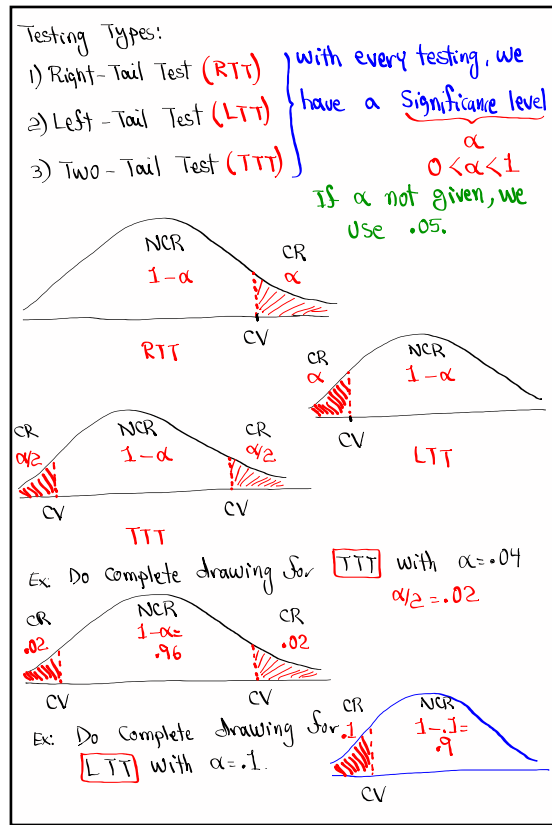
Reject the claim when claim is invalid

OR

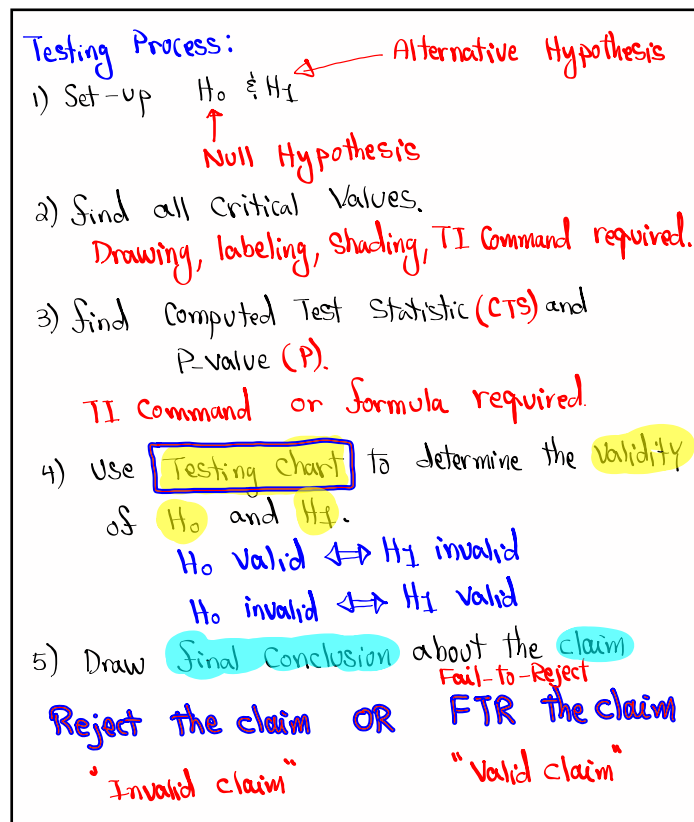
Support
Fail-to-Reject the claim when claim is valid

claim	valid	Invalid
Action		
Reject	Error	Not error
Fail-to-Reject	Not error	Error

May 9-7:29 AM



May 9-7:37 AM



May 9-7:47 AM

More on H_0 & H_1 :

H_0 must contain = Sign. \Rightarrow = , \geq , \leq

H_1 cannot contain = Sign. \Rightarrow \neq , $<$, $>$

Key words:

H_0 : is , equal, Same, at least, at most,

H_1 : is not, not equal, different, more than, less than, above, below, exceed, ...

Claim could be H_0 and H_1 but not at the same time.

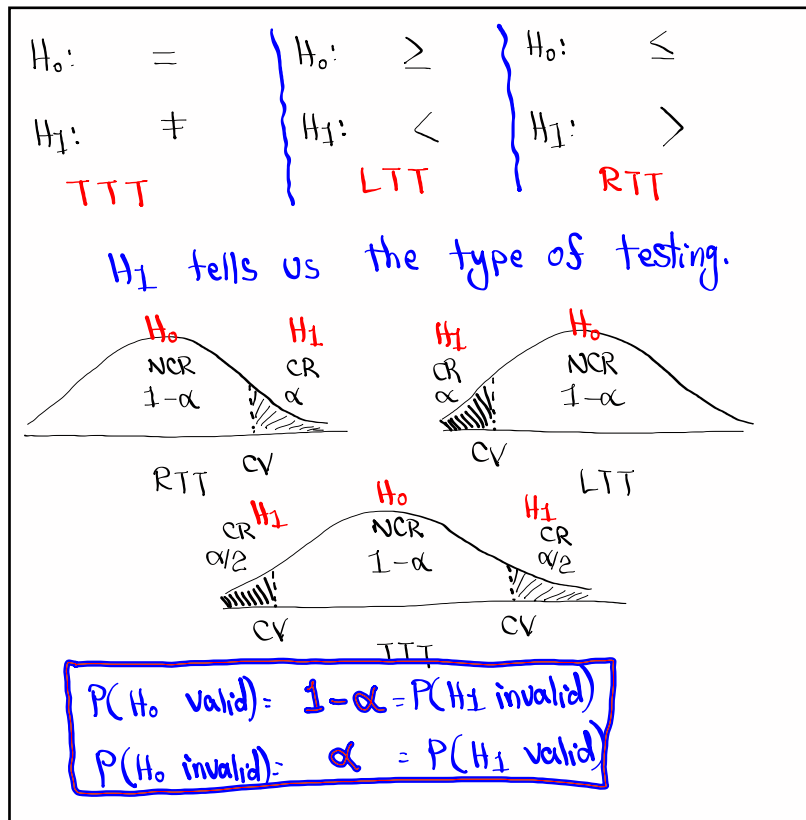
Always identify the claim and type of testing.

$H_1: \neq$ Two-Tail Test

$H_1: <$ Left-Tail Test

$H_1: >$ Right-Tail Test

May 9-7:58 AM



May 9-8:05 AM

Four - Possible outcomes for H_0

Reality \ Conclusion	H_0 valid	H_0 invalid
Support H_0	Correct Decision	Type II error
Reject H_0	Type I error	Correct Decision

May 9-8:13 AM

The College claims that 10% of all students

Smoke:

$$H_0: p = .1 \text{ claim}$$

$$H_1: p \neq .1 \text{ TTT}$$

The College claims that the mean of all exams is at least 78.

$$H_0: \mu \geq 78 \text{ claim}$$

$$H_1: \mu < 78 \text{ LTT}$$

The College claims that standard deviation of ages of all students is above 10 yrs.

$$H_0: \sigma \leq 10$$

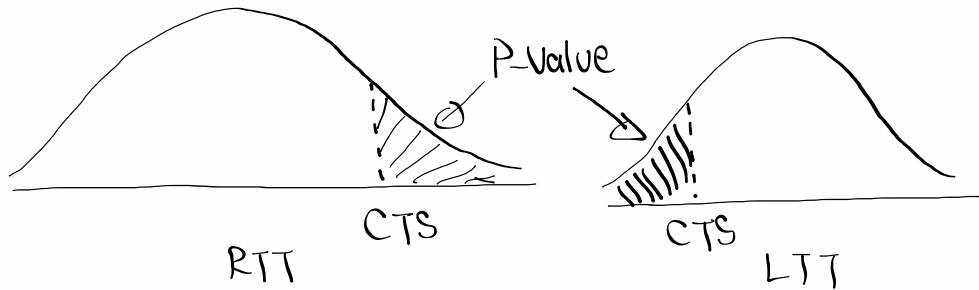
$$H_1: \sigma > 10 \text{ claim, PTT}$$

May 9-8:18 AM

what is P-Value?

P-Value is the area of the tail in the direction of H_1 marked by CTS.

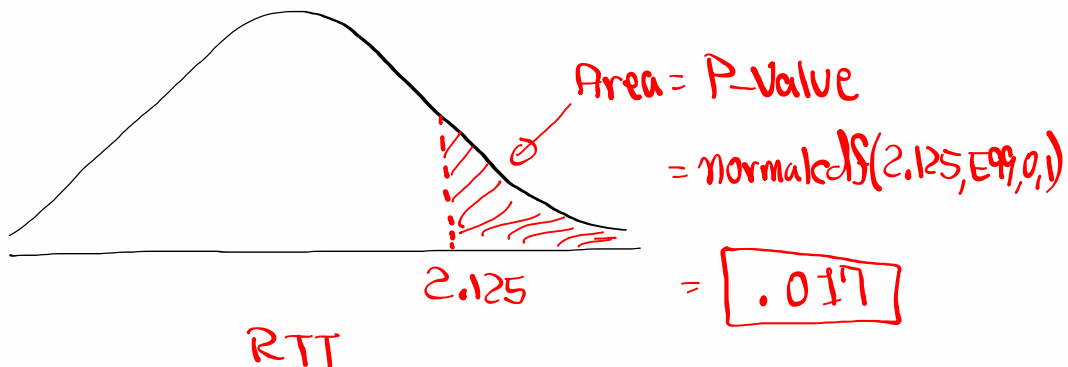
Multiply that area by 2 only for TTT.



only for TTT, multiply by 2.

May 9-8:24 AM

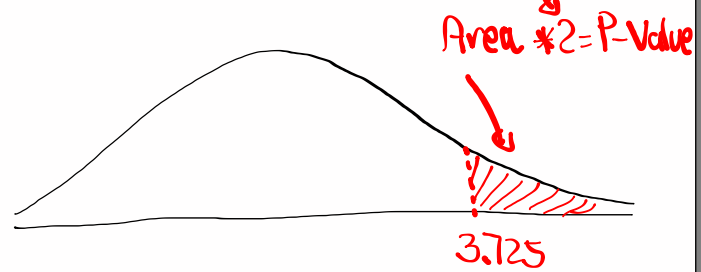
Suppose CTS $Z=2.125$, RTT, find P-Value.



May 9-8:28 AM

Suppose CTS $t=3.725$, TTT, $df=19$

Find P-value.



$$P\text{-value} = 2 * tcdf(3.725, E99, 19) = \boxed{.001}$$

May 9-8:30 AM