DATA

population

Example:

All students attending Ryerson University

$N = 30{,}000$ → 30,000 Xs values.

↓ population size

X = ~~GPA~~ G.P.A for a student

quantitative

pop Mean : μ ..

pop Standard deviation : σ

Unknown.

SAMPLE

Subset of population

$n = 30$ or 40 etc

↓ sample size

X = GPA for a student

Sample Mean : $\overline{X}$

Sample Standard deviation : S

. . .

Known

(1) π = population proportion of retail outlet included the GST in their pries

sample data

X = # of retail outlet included the GST in their prices = 165

n = sample size = 300 $\quad \underbrace{\alpha = 0.05}_{\text{to define RR using C.V}}$

$p = \frac{x}{n} = \frac{165}{300}$

Hypothesis Statement

$H_0: \pi \leq 0.5$

$H_a: \pi > 0.5$

$H_0: \pi \leq \pi_0$
$H_a: \pi > \pi_0$ } π_0 is always given when you assume H_0 is true $\pi = \pi_0$

3 symbols: $\neq, >, <$ } just like Calculator input (TEST)

To test the above hypothesis:

1) Setup the RR → ie. set up the decision frame

2) Calculate the test Statistics/p-value using sample data, you this information to make 2 decisions:

I) Statistical decision : a) Reject H_0
b) Do not reject H_0

II) Managerial decision : There is (no) evidence

$H_0: \pi = 0.5$

$H_a: \pi \neq 0.5$ (Two tailed test)

→ Z test

Sample data

$x = 369$

$n = 899$

convert p to Z calc

$p = \text{sample prop} = \frac{x}{n}$

CALC PRO = TEST

$Z-(1-p) \rightarrow \boxed{Z_{calc} = -5.3697, \; p\text{-value} = 0.0000008}$

I) Set up R.R

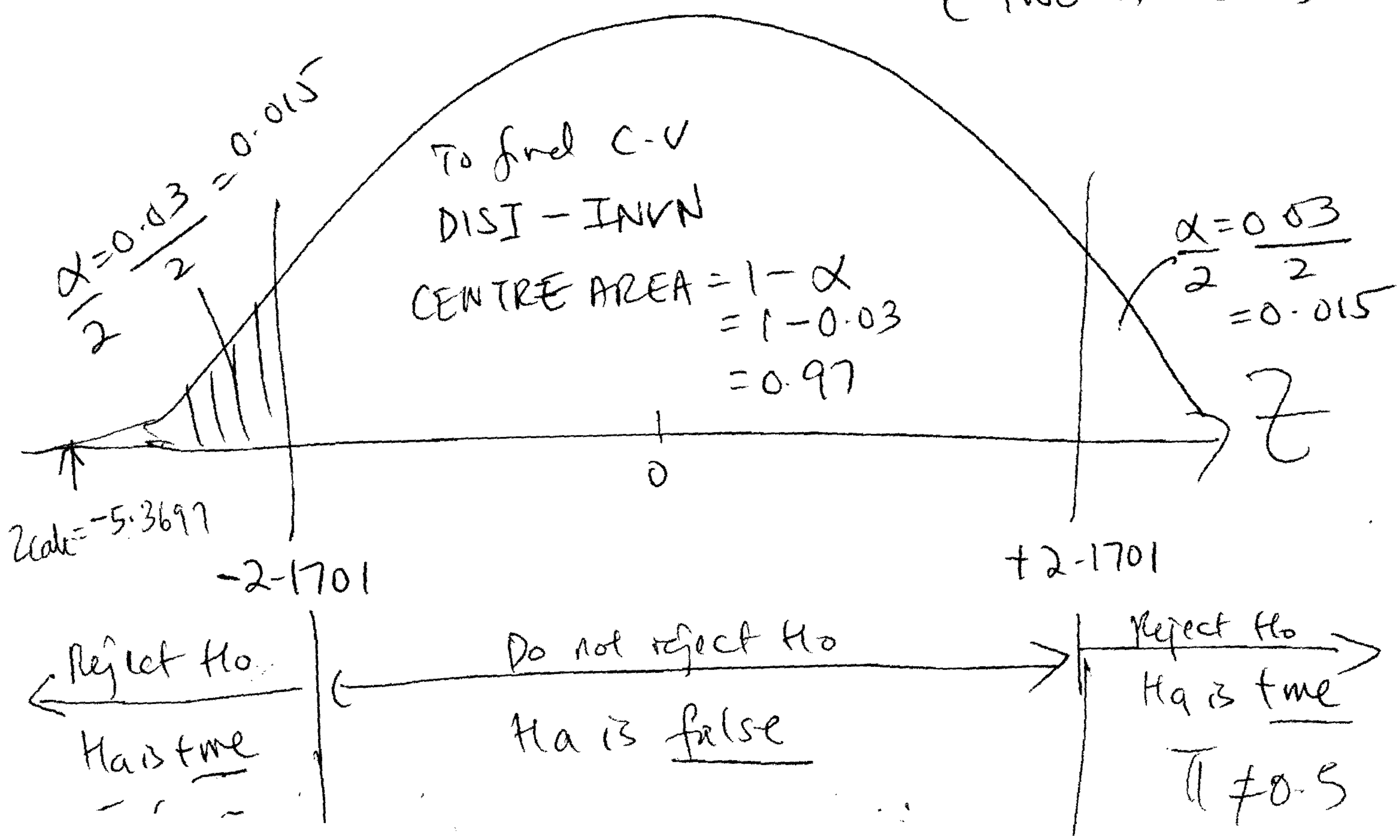
1) $\alpha = 0.03$

2) Critical value Z

3) where RR?

$H_a: \pi \neq 0.5$

(two tailed)



I) $H_0: \pi \le 0.5$

$H_a: \pi > 0.5$

Setup the RR → 1) $\alpha = 0.05$ Always

→ 2) Critical value Z

→ 3) Where is the RR area? $H_a: \pi > 0.5$

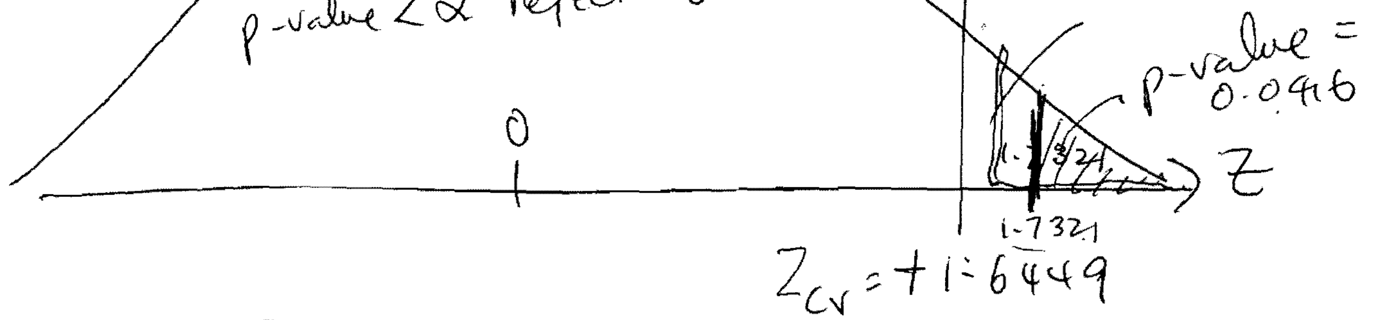
II) Calculate test statistic

1) Value: $Z_{calc} = 1.7321$ → Critical value app

2) Area: p-value = 0.0416 → p-value app

p-value < α Reject H_0

DISI - INVN → $\sigma = 1, \mu = 0$



$Z_{calc} < 1.6449$	$Z_{calc} > 1.6449$
Do not reject H_0	Reject H_0
H_a is false	H_a is true
There is NO evidence to support $\pi > 0.5$	There is evidence $\pi > 0.5$

To find C I

INTR

- Z
  - σ is given / known
    - 1-S: $\_ \le \mu \le \_$
    - ~~2-S~~: $\mu_1\ \mu_2$
    - 1-p: $\_ \le \pi \le \_$
    - ~~2-p~~: $\pi_1\ \pi_2$
- t
  - σ is <u>not</u> given or known
    - 1-S: $\_ \le \mu \le \_$
    - ~~2-S~~: μ_1 & μ_2

To find Critical Value

DIST

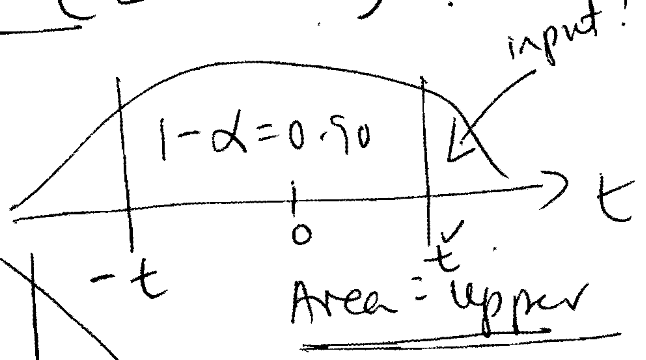
- z
  - NORM
  - INVN
  - <u>Caution</u>
  - ~~Calc~~:
  - Always $\boxed{\text{var}}$ (F2)
  - Tail:
  - Area:
  - $\sigma : 1$
  - $\mu : 0$
- t
  - DIST
  - ↓
  - t
  - ↓
  - Invt
  - <u>Caution</u>
  - Always
  - $\boxed{\text{var}}$ F2
  - <u>AREA</u>: ____
  - ↓
  - refers to upper tail area always

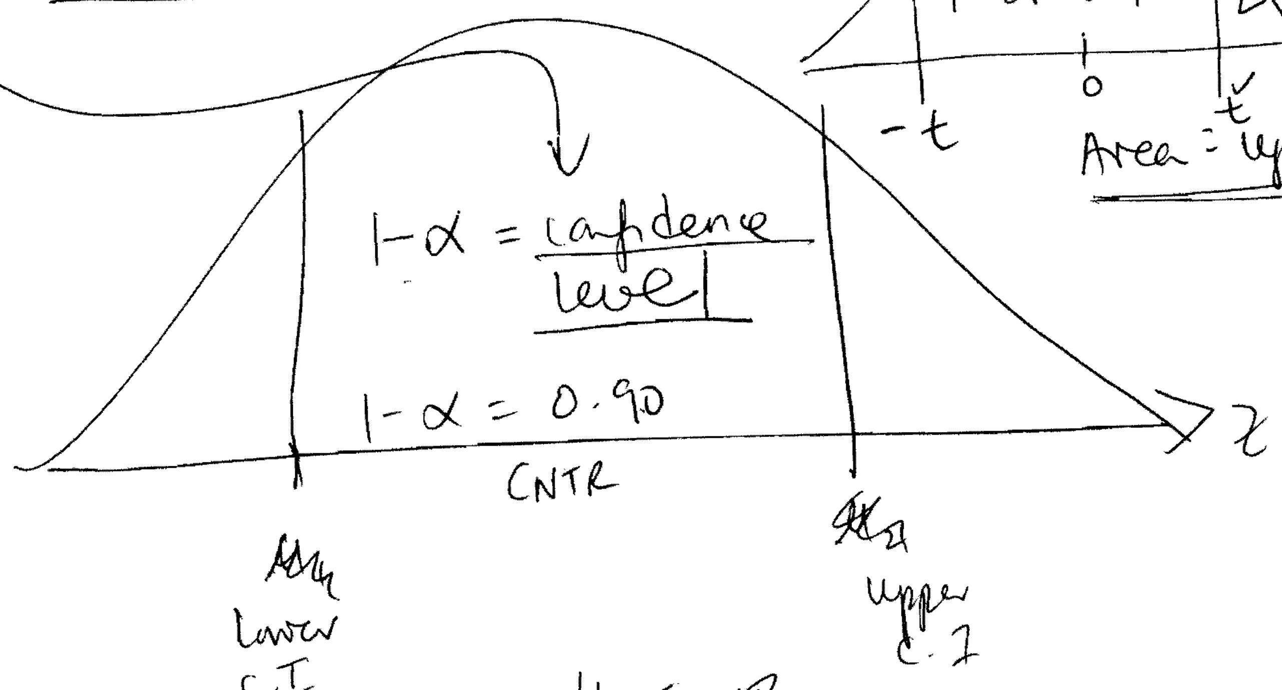
To find Confidence Interval

90% confidence interval for μ or π

Find the critical ~~value~~ value (z or t).

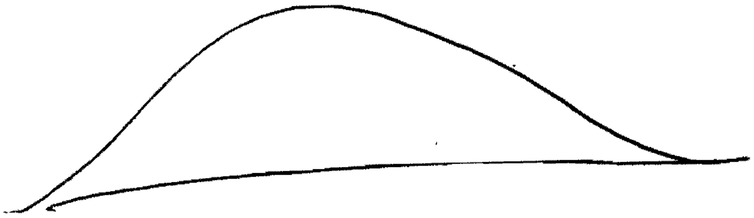
z critical value





$\cancel{\bar{x}_1} \le \mu \le \cancel{\bar{x}_2}$

For Hypothesis Testing → given α = significance level



Hypothesis testing

TEST

z

- 1-S
  - $H_0: \mu = 70$
  - $H_a: \mu \neq 70$
- ~~2-S~~
  - $\cancel{H_0: \mu_1 - \mu_2 = 0}$
  - $\cancel{H_a: \mu_1 - \mu_2 \neq 0}$
- 1-p
  - $H_0: \pi = 0.5$
  - $H_a: \pi \neq 0.5$
- ~~2-p~~
  - $\cancel{H_0: \pi_1 - \pi_2 = 0}$
  - $\cancel{H_a: \pi_1 - \pi_2 \neq 0}$

t

- 1-S
  - $H_0: \mu = 70$
  - $H_a: \mu \neq 70$
- ~~2-S~~ Test2
- ~~REG~~