A company wanted to compare the performance of its call centre employees in two different centres located in two different parts of the country – Hyderabad, and Bengaluru, in terms of the number of tickets resolved in a day (hypothetically speaking). The company randomly selected 30 employees from the call centre in Hyderabad and 30 employees from the call centre in Bengaluru. The following data was collected:

Hyderabad: $\bar{x}1 = 750$, $\sigma1 = 20$ → x_1

Bengaluru: $\bar{x}2 = 780$, $\sigma2 = 25$ → x_2

$\alpha = 5\%$

$P_\alpha = 0.05$

$H_0 : \bar{x}_1 = \bar{x}_2$

$H_A : \bar{x}_1 \neq \bar{x}_2$

$H_0 : x_1 \leq x_2$

$H_{A_1} : x_1 > x_2$

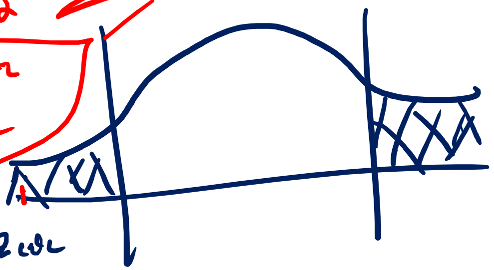
$P_{calc} > P_\alpha \rightarrow AR$

$H_0 : x_1 \geq x_2$

$H_A : x_1 < x_2$

$P_{calc} < P_\alpha \rightarrow RR$

$$Z_{calc} = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$$



Z_{calc}

left area

P_{calc} = # of tails * AUC of the tail

→ $2 * A_L(Z_{calc})$

$A_L(-4) \approx 0$ | $P_{calc} \approx 0$

$$\Rightarrow \frac{750 - 780}{\sqrt{\frac{20^2}{30} + \frac{25^2}{30}}} \rightarrow \frac{-30}{\sqrt{\frac{400+625}{30}}} = \frac{-30}{\sqrt{\frac{1025}{30}}} = -5.13$$

$P_{calc} < P_\alpha \rightarrow RR$

Reject the H_0, Accept H_A

Mean entry-level salaries for college graduates with mechanical engineering degrees and electrical engineering degrees are believed to be approximately the same. A recruiting office thinks that the mean mechanical engineering salary is actually lower than the mean electrical engineering salary. The recruiting office randomly surveys 50 entry level mechanical engineers and 60 entry level electrical engineers. Their mean salaries were $46,100 and $46,700, respectively. Their standard deviations were $3,450 and $4,210, respectively. Conduct a hypothesis test to determine if you agree that the mean entry-level mechanical engineering salary is lower than the mean entry-level electrical engineering salary.

$H_0 \Rightarrow \bar{x}_1 \geq \bar{x}_2$

$H_A \Rightarrow \bar{x}_1 < \bar{x}_2$ } Left tail Test

$h_0 \Rightarrow \bar{x}_1 \leq \bar{x}_2$

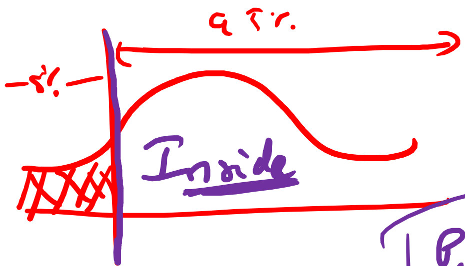
$\bar{x}_1 > \bar{x}_2$ Right

$P_{calc} = P_\alpha \Rightarrow RR$ → H_A

$\alpha = 5\%$

$P_\alpha = 0.05$

$\dfrac{\bar{X} - \mu}{\bar{x}_1 - \bar{x}_2}$



$P_{calc} \Rightarrow$ # tails * AUC on that tail

$\rightarrow 1 * A_{L\,z_{calc}}$

$Z_{calc} = \dfrac{\bar{x}_1 - \bar{x}_2}{\sqrt{\dfrac{\sigma_1^2}{n_1} + \dfrac{\sigma_2^2}{n_2}}}$

$= \dfrac{46100 - 46700}{\sqrt{\dfrac{3450^2}{50} + \dfrac{4210^2}{60}}}$

$P_{calc} > P_\alpha = AR$

$P_{calc} \leq P_\alpha = RR \Rightarrow$

$P_{calc} > P_\alpha \Rightarrow AR$

$P_{calc} \Rightarrow 0.20611$

≈ 0.79

Failed to reject H_0, Reject H_A

$Z_{calc} \Rightarrow -0.82$

→ T-Test

→ Student's T-distribution

→ Gosset → 1876

Taj Mahal

Agra, UP

20 Pax

6 am

10 am

Z dist

Is more power

On the Same Confidence level the

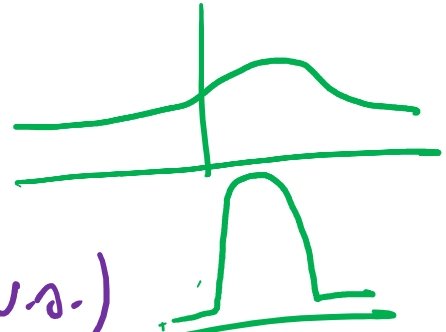
Significance

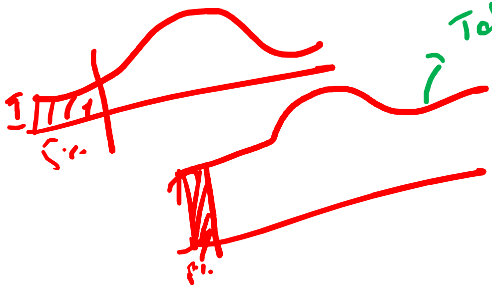
range is increasing

↓

Limit

Interval

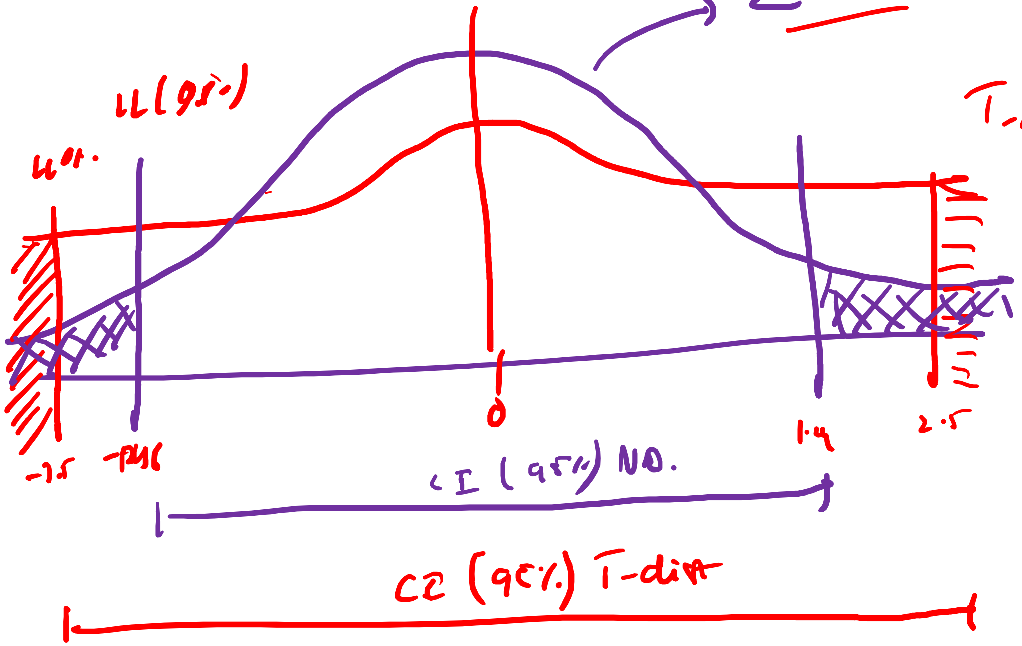




Tolerance

Economy

Z-dist (N.D.)



± 1.96

± 2.5

Tail of N.D

less Confidence

On the Sample

Normal Distribution / z-distribution / bell-curve

↳ mean the same

z-dist?

↓ definition?

SND

↳ specialist type of ND / z-dist / bell curve

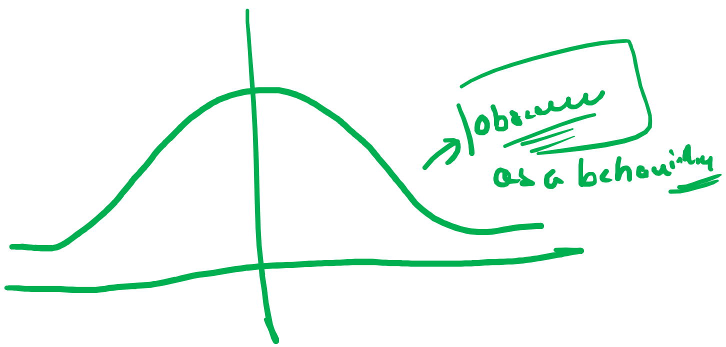
$\mu = 0$ | $\sigma = 1$

Any ND $\xrightarrow[\text{z-score}]{\text{Using}}$ SND

SND ⇒ z-dist

ND ≠ z-dist

Score 100



0

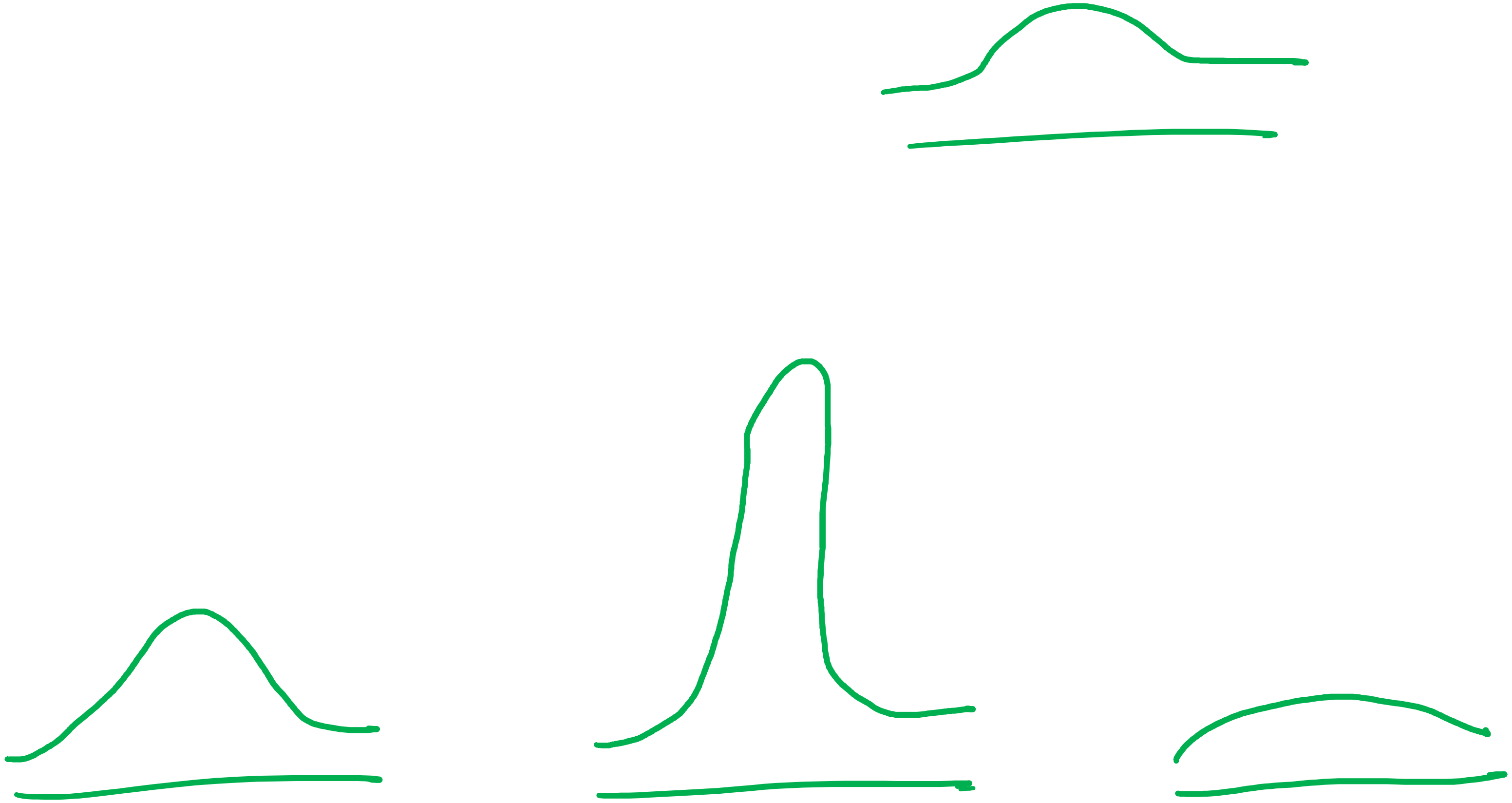
10

20

30

40

100



When to use T-Test over a Z-Test?

When we are LESS confident on our Sample

↳ is based or

① → pop σ is unknown
② → when n < 30

→ either or both

① ②

① & ②

On the same data

Z Test when a smaller CI

T-test will have a larger CI