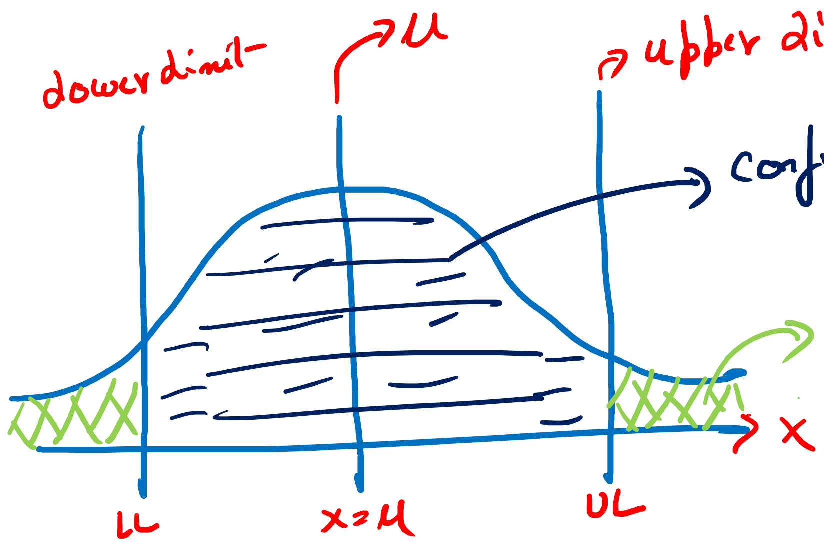
False

H_0 ⇒ Null hypothesis (historic claim) ⇒ True if, $\bar{X}$ lies inside the confidence Area

H_A ⇒ Alternate Hyp (Current Claim) ⇒ True if, $\bar{X}$ lies inside the significance Area



confidence Area (Acceptance Region)

Significance Area

↓

α (significance level)

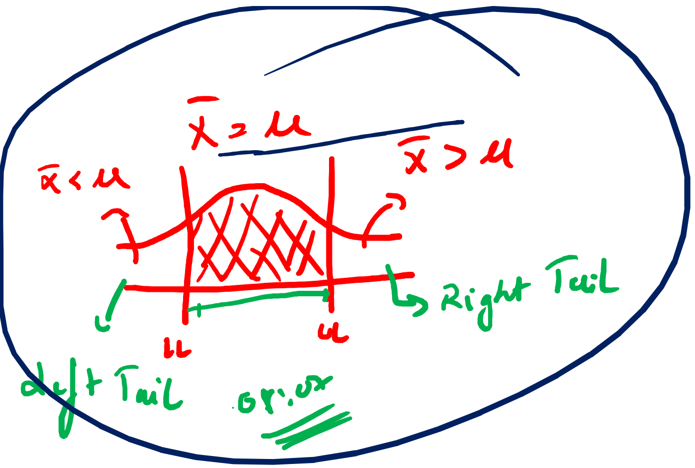
(Rejection Region)

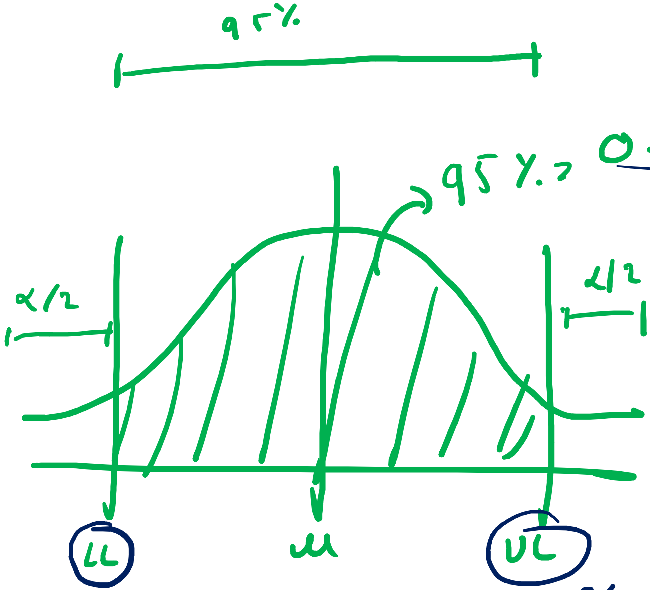
N.D.

C.I.

confidence Int.

Default $\alpha = 5\%$





$95\% = 0.95$

$0.025 \Leftarrow \frac{0.05}{2}$

$\alpha/2 \rightarrow \frac{0.05}{2} = 0.025$

$\mu \pm 1.96\sigma = 95\%$

$\mu \pm 2\sigma = 95.45\%$

$Z_{-\alpha} = -1.96$

$Z_{\alpha} = 1.96$

Z score $\xrightarrow{I/P}$ $\boxed{Z\text{-table}}$ $\xrightarrow{O/P}$ AUC_L

Forward lookup

Reverse lookup $\rightarrow$

$A_L \rightarrow$ $\boxed{Z\text{-table}}$ $\rightarrow$ Z score

$A_L(UL) \Rightarrow 0.95 + 0.025 = 0.97500$

$A_L(LL) \Rightarrow 0.02500$

Point E. $\bar{x} = \sigma$

Interval $\sigma(\pm)$ [2, 10)

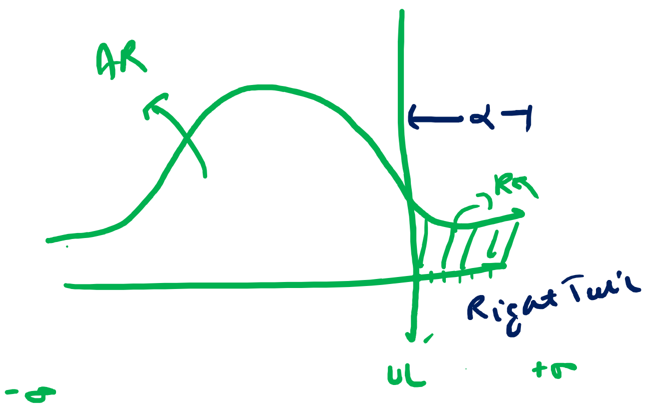
$\ge$ (UL, $+\infty$) $\le$ ($-\infty$, LL)

$=$ [LL, UL]

Right-Tail Z Test

$H_0 \Rightarrow \bar{X} \le \mu$ ($-\infty$, UL)

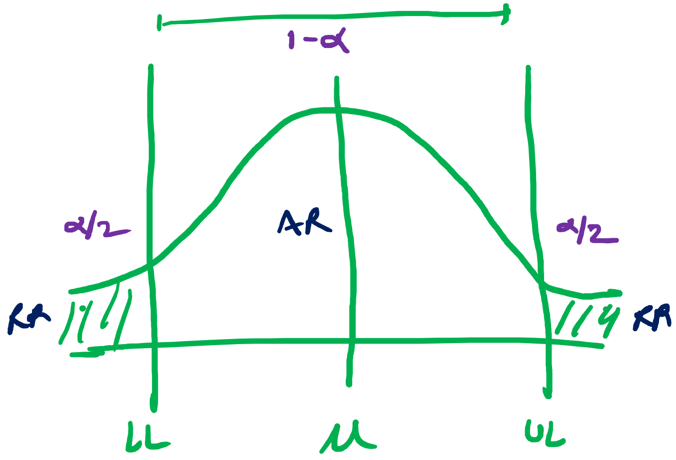
$H_A \Rightarrow \bar{X} > \mu$ ($\bar{x}$ > UL)



2-Tail Z Test

$H_0 \Rightarrow \mu = \bar{X}$

$H_A \Rightarrow \mu \neq \bar{X}$ | $\mu <> \bar{X}$



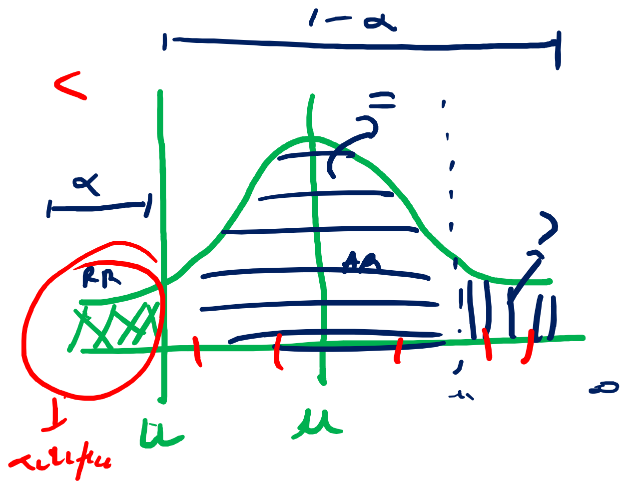
RR on both the Tails,

Left Tail Z-Test

$\mu \le \bar{X}$

$H_0 \Rightarrow \bar{X} \ge \mu$

$H_A \Rightarrow \bar{X} < \mu$ ($\bar{x}$ < LL)



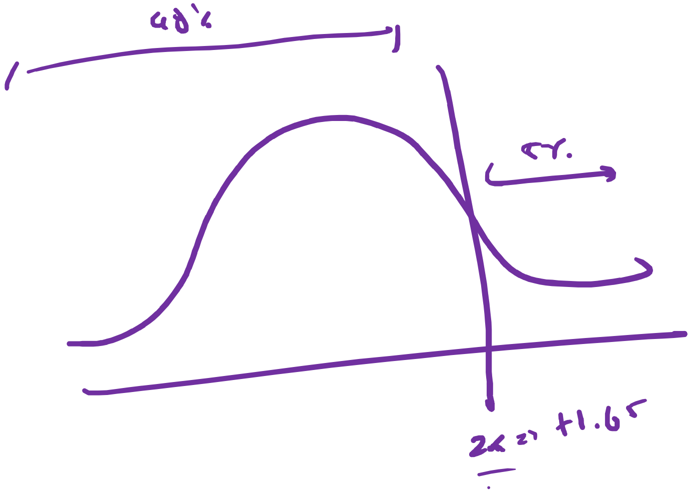
$\alpha \Rightarrow$ Significance Area
$\perp$
RR

Conf. $\Rightarrow (1-\alpha)$
$\perp$
AR

10 kg in 5 days (=)

more than 10kg in 5 days ≥ 10

lower shortage in 5 days : ≤ 10



$z_\alpha = -1.96$

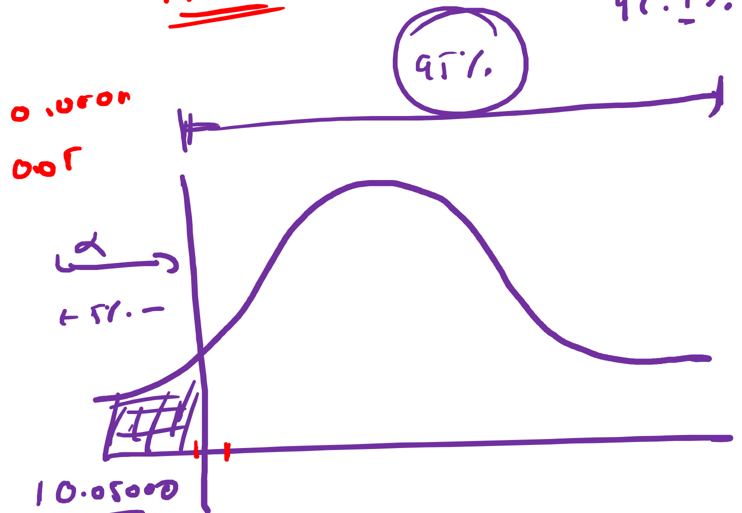
↳ AUC = 0.02500

0.005

99.995

99.9%

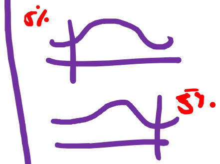
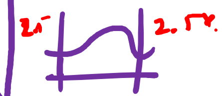
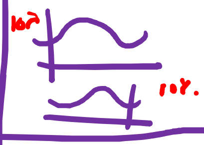
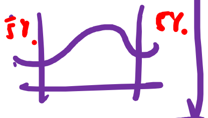
95.1%



→ CI should not squeeze

$A_L = \boxed{0.05000}$

z-score??

α			
5%	1T	±1.65	
	2T	±1.96	
10%	1T	±1.28	
	2T	±1.65	

→ CLT → Central Limit Theorem

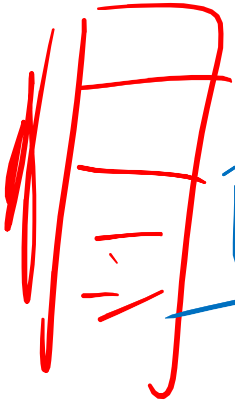
Can convert any type of distribution into a Normal Distribution

→ $E(\bar{x}) = \mu$

→ $E(\sigma) = \sigma/\sqrt{N}$ → Std. Error

Dist. of mean of the samples

$\bar{x}$



To generalize the R.T.

$CI = \mu \pm z_\alpha \sigma$

Only for

value after N.D.

$$Z = \frac{X - \mu}{\sigma}$$

$\mu \pm Z_\alpha \sigma = CI$

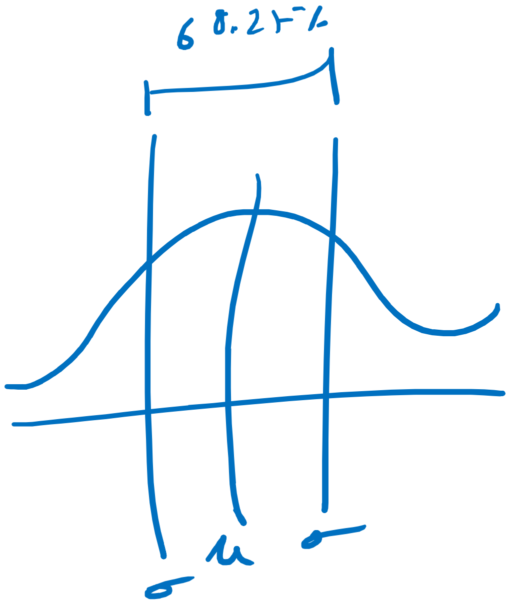
$LL = \mu - Z_\alpha \sigma$, Std. Error

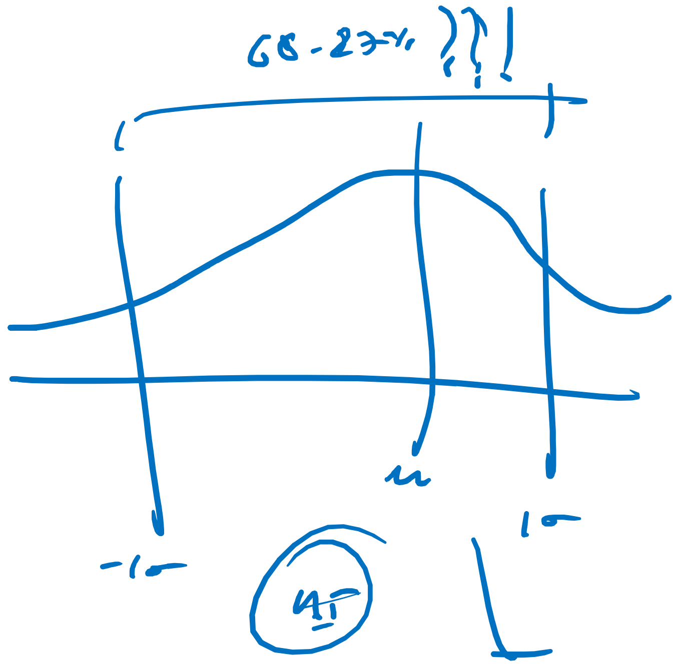
$UL = \mu + Z_\alpha \sigma$

$CI = \mu \pm Z_\alpha * \text{Std. Error}$

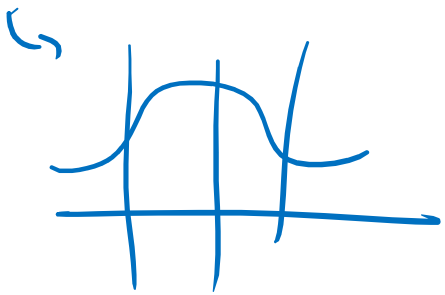
$$CI = \mu \pm Z_\alpha \frac{\sigma}{\sqrt{N}}$$

$$Z = \frac{\bar{x} - \mu}{\sigma/\sqrt{N}}$$





CLT



A principal at a school claims that the students in his school are above average in terms of intelligence. A random sample of 30 students' IQ scores have a mean of 112.5. The mean population IQ is 100 with STD of 15. Test the hypothesis of principal's claim.

① Frame hypothesis

↳ 1st try to identify the H_A → That we want to test (>, <, ≠)

H_0 → (≥, ≤, =)

× $H_0 = \mu \le 100$ → AR

✓ $H_A = \mu > 100$ → Problem

RR

↳ Right Tail Test

$\bar{X} = 112.5$ → RR → H_A

Accept H_A, Reject H_0

School A → 100 IQ

School A → 105 IQ

Same

② → find the CI

↳

$UL = \mu + Z_\alpha * \text{std error}$

$= \mu + 1.65 * \frac{\sigma}{\sqrt{N}}$

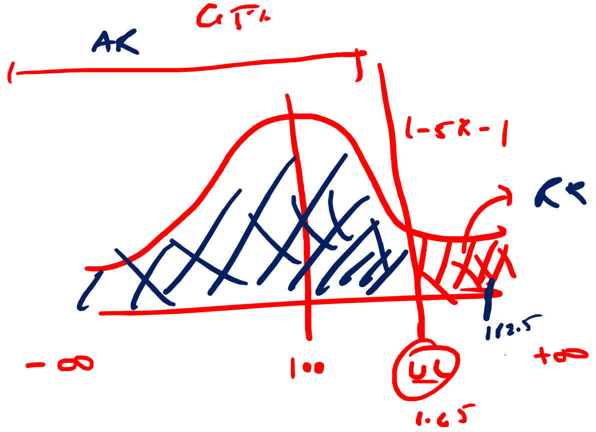
$= 100 + 1.65 * \frac{15}{\sqrt{30}}$ ⇒ 100 + 4.5

→ 104.5 → upper Lw

H_0

AR (−∞, 104.52) 1

RR (104.52, +∞) 2



100

104

1m

1122.5

$\bar{x}$

80

Rice

150-200g

125gm

250g

175gm

190g

500gm

The average weights of students of my class is 168 lbs. A nutritionist believes that the mean is different. She measured the weights of 36 students and found that the mean to be 169.5 lbs with a std of 3.9. AT 95% confidence, is there enough evidence to discard the null hypothesis?

μ $\quad$ $\bar{x}$ $\quad$ σ $\quad$ $\boxed{\alpha = 5\%}$

$H_0 = \mu = 168$

$H_A = \mu \neq 168$ | $\mu <> 168$

↳ RR is on both Tails

$Z_\alpha = \pm 1.96$

H_0 -

H_A -

↳ R...

$2 \neq 3$

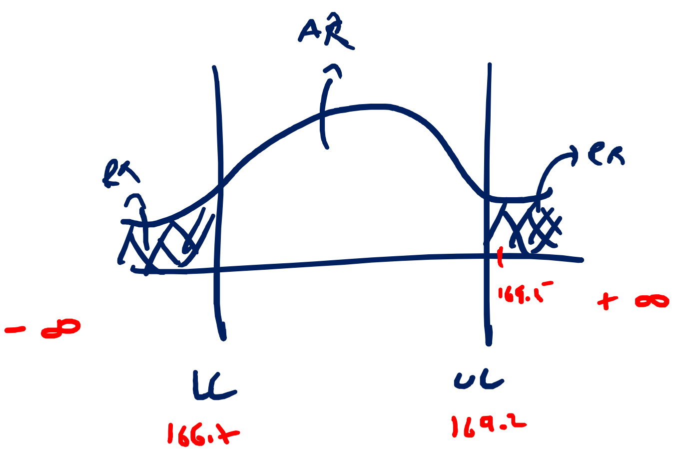
$4 \neq 3$

$\bar{X} = 169.5$

↳ RR → Accept H_A, Reject H_0

$UL = \mu + Z_\alpha \frac{\sigma}{\sqrt{N}}$

$CI = \mu \pm Z_\alpha \frac{\sigma}{\sqrt{N}}$



$UL = 168 + \frac{1.96 * 3.9}{\sqrt{36}} \quad 6 \Rightarrow 169.2$

$LL = \mu - Z_\alpha \frac{\sigma}{\sqrt{N}}$

$LL = 168 - \frac{1.96 * 3.9}{6} \Rightarrow 166.7$