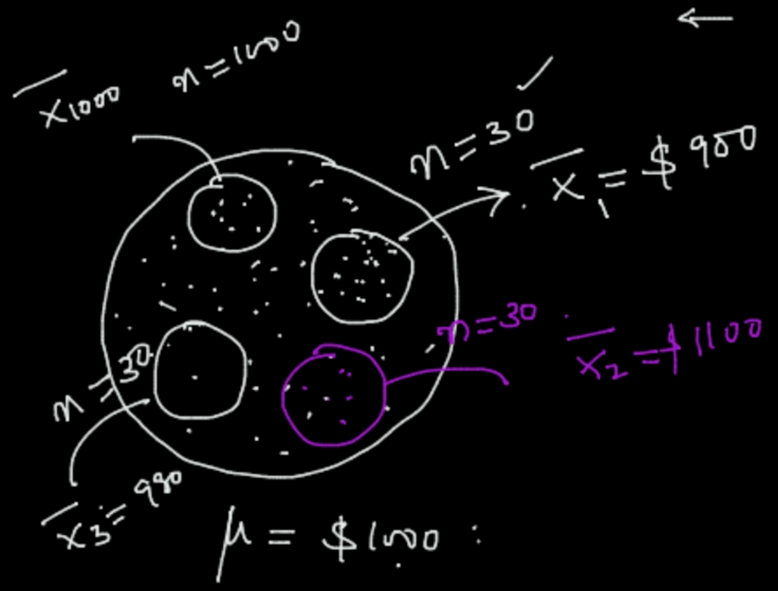
← Central Limit Theorem →



100

$1000 \times 30 \rightarrow 30,000$ ✓

Small samples of size
atleast 30.

No. of samples → 1000.

Sample size → 30.

Sample Means

$\bar{x}_1$

$\bar{x}_2$

$\bar{x}_3$

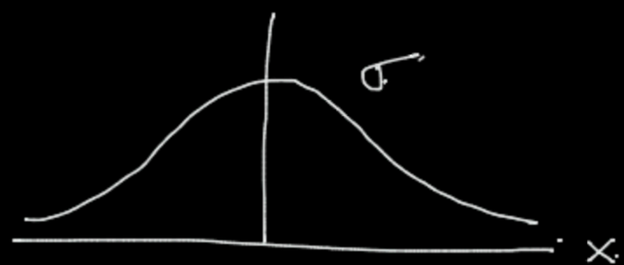
.

.

.

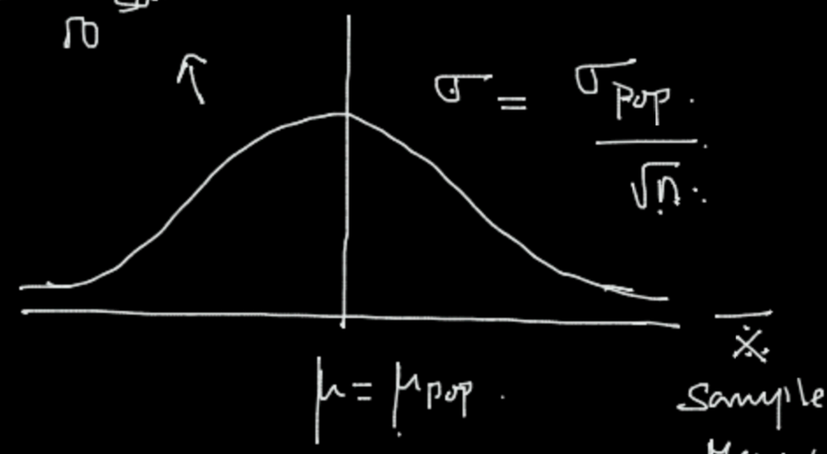
$\bar{x}_{1000}$

$\mu \leq \mu_{pop}$.



$$Z_x = \frac{x - \mu}{\sigma}$$

Sampling dist
of sample means



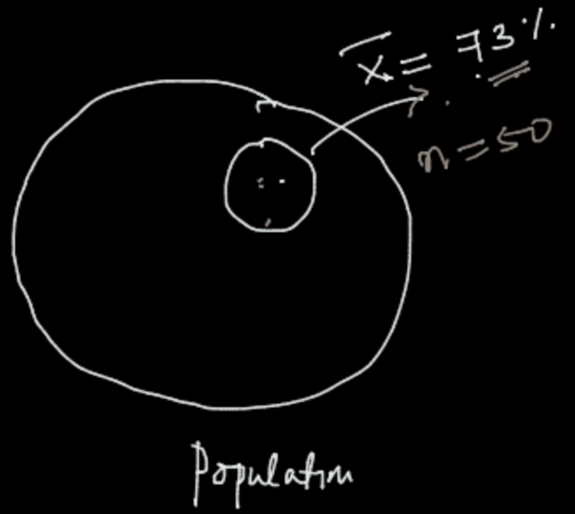
$N.D(\mu_{pop}, \sigma_{pop}/\sqrt{n})$

$n \rightarrow 30$

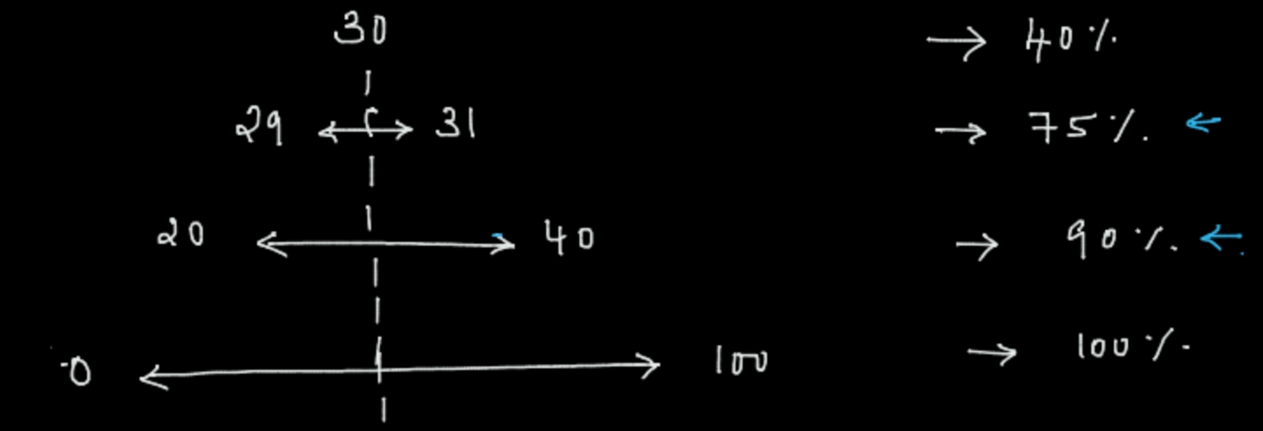
$$Z_{\bar{x}} = \frac{\bar{x} - \mu}{(\sigma_{pop}/\sqrt{n})}$$

← Confidence Interval →

Point Estimate → $\overline{x}$



Confidence Level (C)



→ 40%

→ 75%. ←

→ 90%. ←

→ 100%.

$\Delta = Z_{\alpha/2} \frac{\sigma_{pop}}{\sqrt{n}}$ ✓

$\sqrt{n} \rightarrow 50$

7.04 → 7.92 95%.

7.45

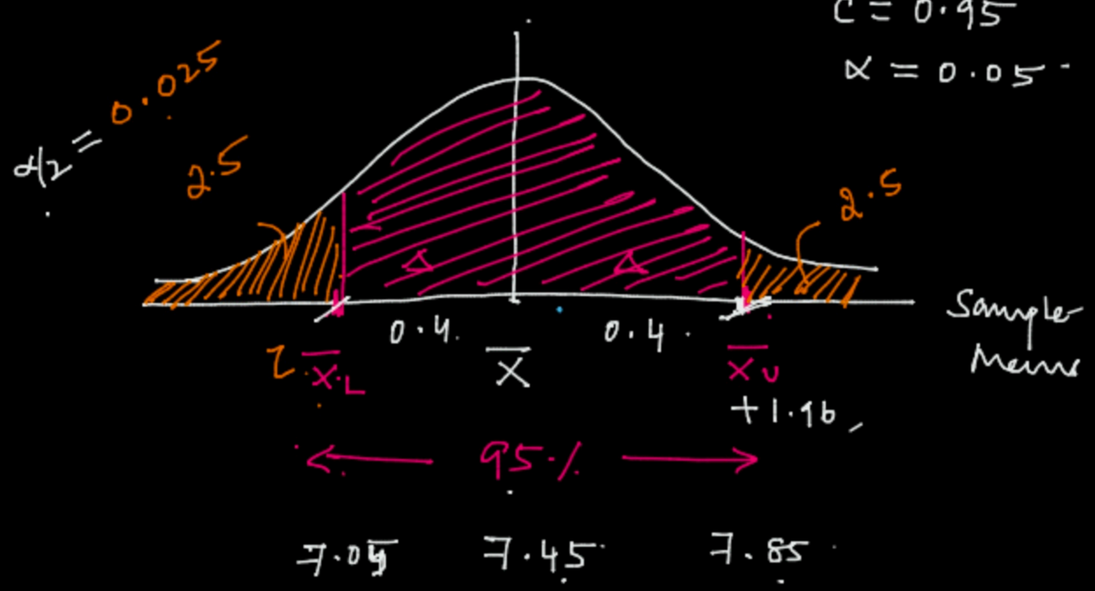
Range Estimate = $\overline{x} \pm \Delta$.

↳ Margin of Error

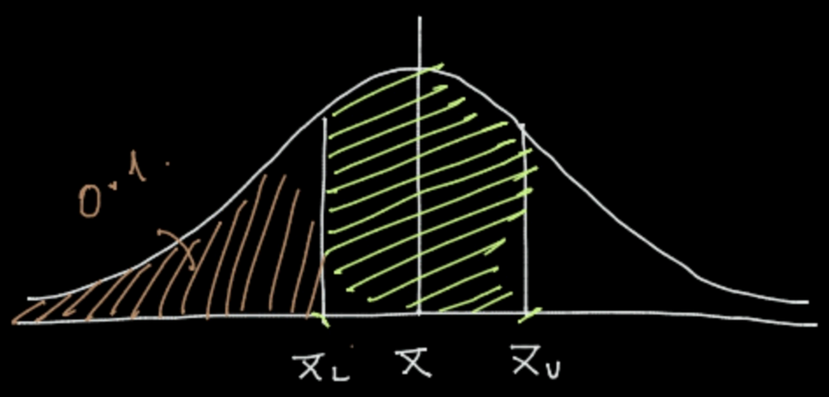
Confidence level (C) → 0.95 ✓

Significance level (α) → $1 - C$

→ 0.05 ✓

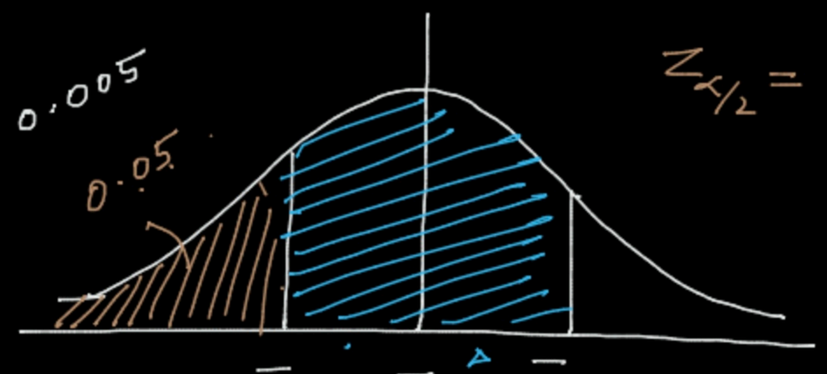


$Z_{\alpha/2} = -1.96$



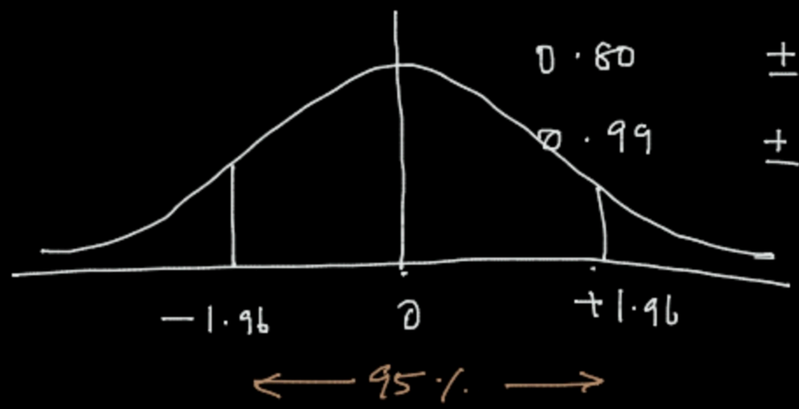
$Z_{\alpha/2} = \pm 1.28$

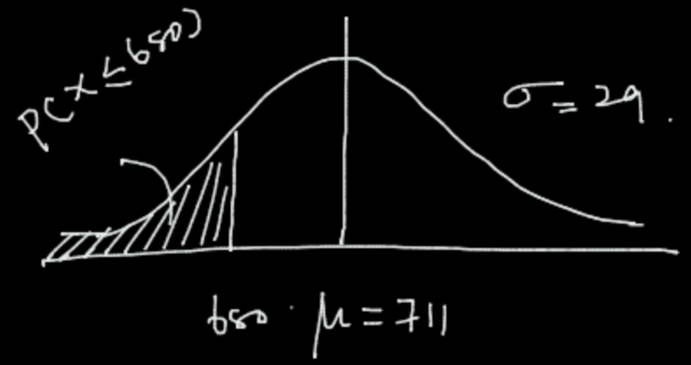
$= (7.45 \pm 0.4)$



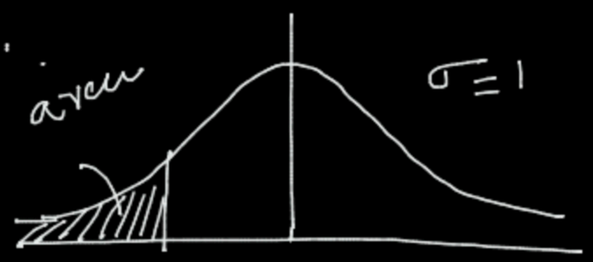
$Z_{\alpha/2} = \pm 1.64$

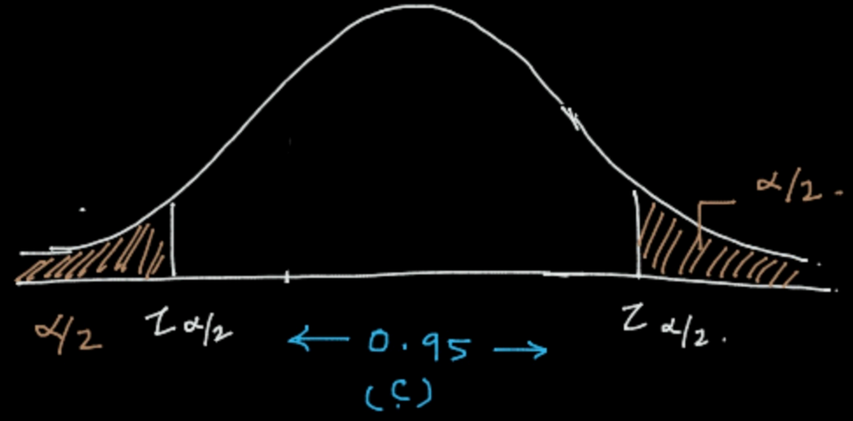
C	$Z_{\alpha/2}$
0.90	± 1.64
0.95	± 1.96
0.80	± 1.28
0.99	± 2.58





Stand. → area





$\alpha = 1 - C$.

$\Delta = z_{\alpha/2} \cdot \frac{\sigma_{pop}}{\sqrt{n}}$ (σ_{pop}: X) → Sample Std.

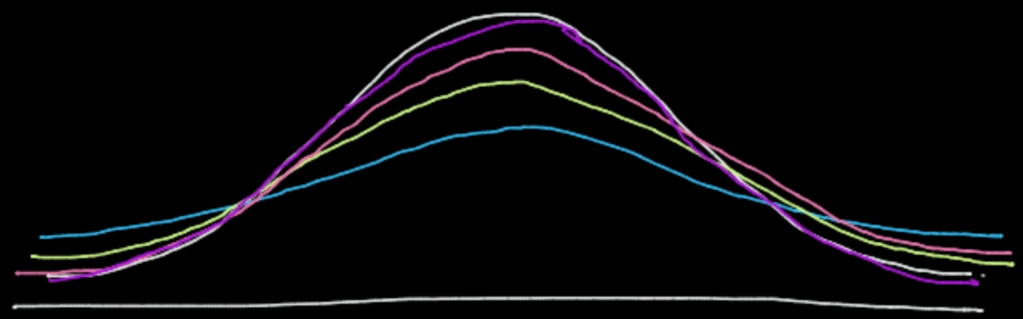
↓

$t_{\alpha/2}$

t - distribution.

— Pop. std. dev. not known.

— when n is very small ($n < 30$).



Z - dist $n > 30$.

$n = 5$; $df = 4$.

$n = 10$; $df = 9$

$n = 20$ $df = 19$.

$n = 30$; $df = 29$

σ_{pop} known.

$$\Delta = z_{\alpha/2} \cdot \frac{\sigma_{pop}}{\sqrt{n}}$$

↓

Z-dist.

σ_{pop} NOT known

$$\Delta = t_{\alpha/2, df} \cdot \left(\frac{s}{\sqrt{n}} \right)$$

↓

t-dist.

$t_{c, df}$ → t-table.

scipy.

- stats.
  - norm.
    - cdf.
      - interval(). ✓
  - t.
    - interval.() ✓.

↳ pop – known, z-dist.

stats.norm.interval( ).

↳ pop – Not known t-dist.

stats.t. interval( ).