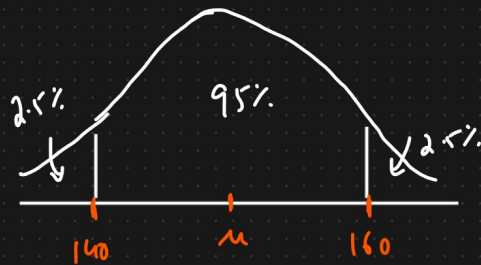# Confidence Intervals and Margin of Error

$$\boxed{\mu = 160}$$

$C.I = 95\%$

$$140 \longleftrightarrow 160$$

Point Estimate :- A Value of any statistics that estimates the value of an unknown population parameter is called Point Estimate

$$\overline{x} \longrightarrow \mu$$
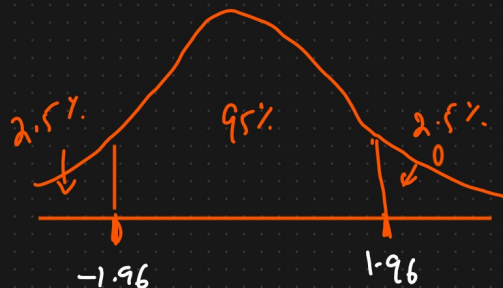
$$\overline{x} = 2.95 \qquad \mu = 3$$

Confidence Interval

We construct a confidence interval to help estimate what the actual value of the unknown population mean is.

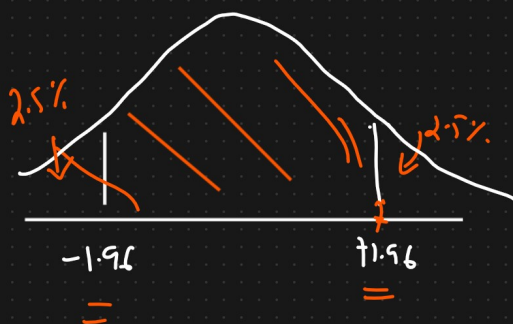$$\text{Point Estimate} \pm \text{Margin of Error}$$

Z Test

$$\overline{x} \pm Z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$$

$\alpha = 0.05$

$Z_{0.05/2} \Rightarrow Z_{0.025}$

2.5%   95%   2.5%

-1.96 1.96

① On the verbal section of CAT Exam, the standard deviation is known to be 100. A sample of 25 test takers has a mean of 520. Construct a 95% C.I about the mean?

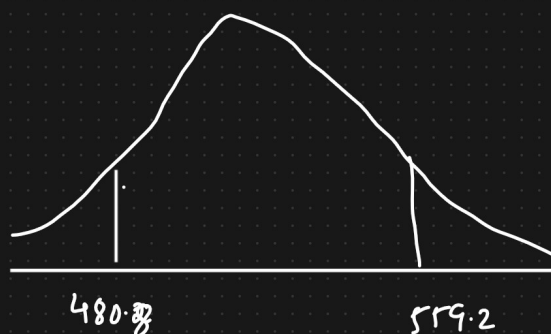Ans) $\bar{x} = 520$ $\sigma = 100$ $n = 25$ $C.I = 0.95$ $\alpha = 0.05$

$1 - 0.25 = 0.9750$

2.5%

2.5%

-1.96 $+1.96$
=   =

$$\bar{x} \pm Z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$$

Lower C.I $= 520 - (1.96) * \dfrac{100}{\sqrt{25}} = 480.8$

Higher C.I $= 520 + (1.96) * \dfrac{100}{\sqrt{25}} = 559.2$

480.8   559.2

I am 95% confident that the mean CAT score lies

between 480.8 and 559.2.