In a Quant test of CAT Exam
The population Std is 100, Sample
of 25 test takers has a mean
of 520, Construct a 80% CI
about the mean.

For
80 percente CI ~~means~~ the
α Should be (1 – ·80)

$$= ·20$$

CI = Point estimator $\pm$ margin of error

$\therefore$ Point estimator $(\bar{x}) = ·520$
Population Std $(\sigma) = 100$
Sample Size $n = 25$

margin of error $= Z_{\alpha/2} * \left(\dfrac{\sigma}{\sqrt{n}}\right)$

$$= Z \dfrac{·20}{2} \times \left(\dfrac{100}{\sqrt{25}}\right)$$

$$= Z·10 \times \left(\dfrac{100}{5}\right)$$

$$[Z·10 = 1 – ·10 = ·90]$$

∴ from Z table, for the area of ·90, the value is
$$= 1.29$$

∴ $Z_{\alpha/2} = 1.29$

margin of error $= 1.29 \times \dfrac{100}{5}$

$= 25.8$

CI $= 520 \mp 25.8$

upper bound $= 520 + 25.8$
$$= 545.8$$

lower bound $= 520 - 25.8$
$$= 494.2$$

CI = 80%

494·2   545·8
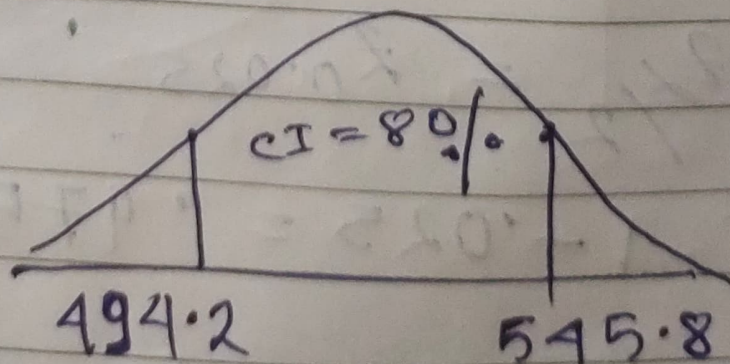
(Q) In a company there are 100K employees. If the company wants to give a T-shirts to all of the employees, then on Average how many XL and L Size T-shirts have to buy.

For Sample size of 500 employees 300 of them are for XL size and 200 of them are for L. Size, calculate for 95% CI

Ans For XL Size

Sample Size (n) = 300

Let's consider Sample mean $(\bar{x}) = 500$

Population Standard deviation is $\sigma = 100$

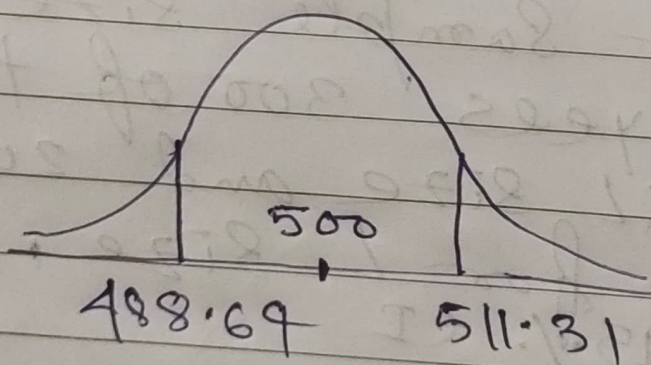$\alpha = 0.05$, $\alpha/2 = 0.025$

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

∴ upper bound $= \bar{x} + Z_{\alpha/2} \times \dfrac{\sigma}{\sqrt{n}}$

$$= 500 + 1.96 \times \dfrac{100}{\sqrt{300}}$$

$$= 500 + 1.96 \times 5.77$$

$$= 500 + 11.31$$

$$= 511.31$$

lower bound $= \bar{x} - Z_{\alpha/2} \times \dfrac{\sigma}{\sqrt{n}}$

$$= 500 - 1.96 \times \dfrac{100}{\sqrt{300}}$$

$$= 500 - 11.31$$

$$= 488.69$$

488.69   500   511.31

∴ We can estimate that on Average 488.69 to 511.31 employees needed XL size t-shirts.

For L size.

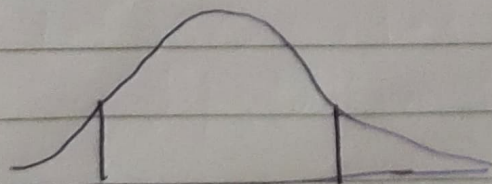Sample size $(n) = 200$

Let's consider —

Sample mean 500
Population std $= 100$

$$Z_{\alpha/2} = \frac{Z.05}{2} = 1.96$$

$\therefore$ upper bound $= \bar{x} + Z_{\alpha/2} \times \frac{S}{\sqrt{n}}$

$$= 500 + 1.96 \times \frac{100}{\sqrt{200}}$$

$$= 500 + 13.86$$

$$= 513.86$$

Lower bound $= \bar{x} - Z_{\alpha/2} \times \frac{S}{\sqrt{n}}$

$$= 500 - 13.86$$

$$= 486.14$$

486.14   513.86

~~486.14~~ The Average numbers of
employees ~~for these~~ are
486.14 to 513.86 who wears L size