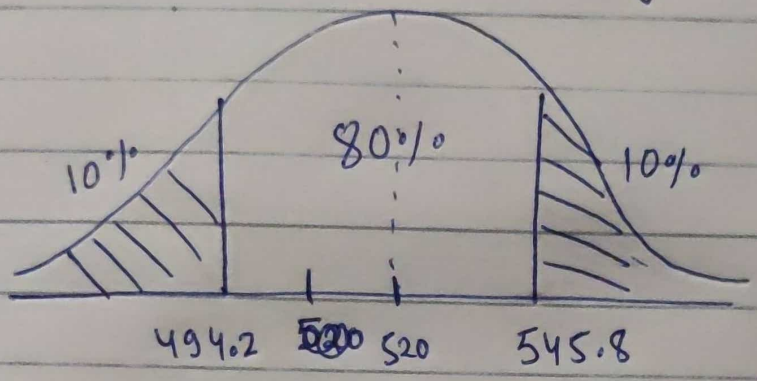
Q) In a quant test of the CAT exam, The population standard deviation is known to be 100. A sample of 25 tests taken has a mean of 520. Construct an 80% CI about the mean.

Sol. So here $n = 25$ $\quad \sigma = 100$

$\bar{x} = 520$

population standard deviation is given so we will use **Z-test**.



$CI = 80\%$

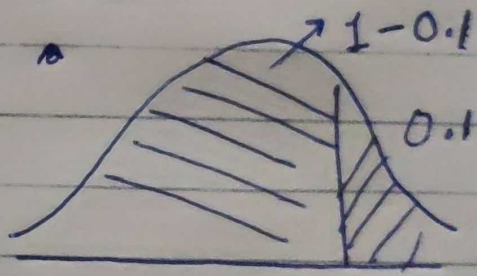
$\alpha = 1 - 0.8$ {Significance value}

$= 0.2$

$\frac{\alpha}{2} = 0.1$

$Z_{\alpha/2} = 1.29$

Point of Estimate $\pm$ Margin of Error



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

$\Rightarrow$ Lower fence $= \bar{x} - Z_{\frac{\alpha}{2}} \frac{\sigma}{\sqrt{n}}$

$= 520 - Z_{0.1} \times \frac{100}{\sqrt{25}}$ $= \boxed{494.2}$

$\Rightarrow$ Higher fence $= \bar{x} + Z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$

$= 520 + Z_{0.1} \times \frac{100}{\sqrt{25}}$

$= \boxed{545.8}$

Ans $\Rightarrow$ 80% CI about the mean present between {494.2 - 545.8}