Q1:

In the Quant test of CAT exam, the population standard deviation is known to be 100. A sample of 25 test takers has a mean of 520. Construct a 80% C.I. about the mean.

Ans:

Given: $\sigma = 100$, $n = 25$, $\bar{x} = 520$

C.I. $= 80\% = 0.80$

$\alpha = 1 - 0.80$

$\boxed{\alpha = 0.20}$

Z-test:

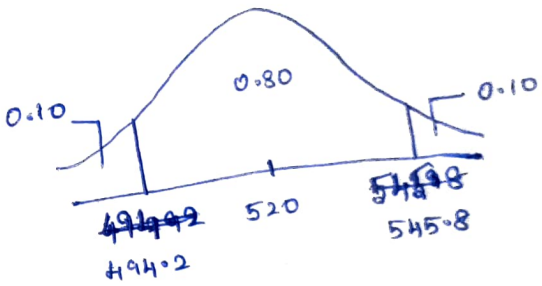
Point Estimate $\pm$ Margin of Error

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

$$Z_{\alpha/2} = Z_{\frac{0.20}{2}} = Z_{0.10}$$

$$1 - 0.10 = 0.90$$

$\boxed{Z_{\alpha/2} = 1.29}$



Lower fence:

$$L.F. = \bar{x} - Z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$$

$$= 520 - 1.29\left(\frac{100}{\sqrt{25}}\right)$$

$$= 520 - 1.29(20)$$

$$= 520 - 25.8$$

$$= 494.2$$

Higher fence:

$$H.F. = \bar{x} + Z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$$

$$= 520 + 1.29\left(\frac{100}{\sqrt{25}}\right)$$

$$= 520 + 25.8$$

$$= 545.8$$