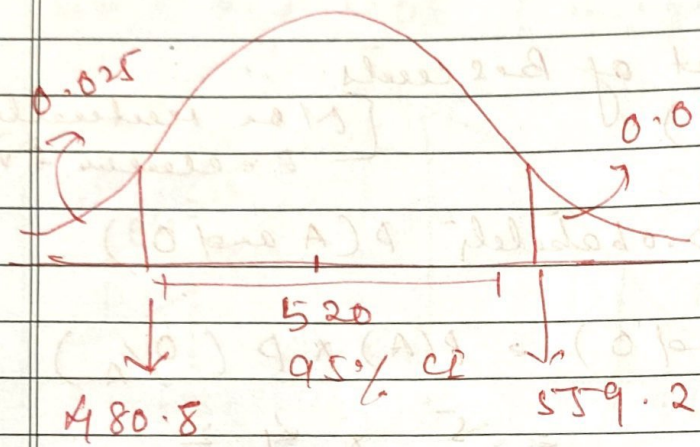
Assignment Sheet - 6

Question - 1 - In the Quant test of the CAT exam, the population SD is known to be 100. A sample of 25 test takers has a mean of 520. Construct a 95% confidence interval above the Mean.

Ans - $\sigma = 100$ $n = 25$ $\bar{x} = 520$ CI = 95%



2 tailed test
Population SD is given
→ Z test

Point Estimate ± Margin of Error

$$= \bar{x} \pm Z_{\alpha/2}\left(\frac{\sigma}{\sqrt{n}}\right)$$

$\alpha = 5\%$
$1 - CI = 0.05$
$\alpha/2 = 0.025$

$$Z_{\alpha/2} = 1 - 0.025$$
$$= 0.975$$
$$= 1.96$$

$$\text{Lower Limit} = \bar{x} - Z_{\alpha/2}\left(\frac{\sigma}{\sqrt{n}}\right)$$
$$= 520 - 1.96 \times \frac{100}{\sqrt{25}}$$
$$= 520 - 1.96 \times 20$$
$$= \boxed{480.8}$$

$$\text{Higher Limit} = \bar{x} + Z_{\alpha/2}\left(\frac{\sigma}{\sqrt{n}}\right)$$
$$= 520 + 1.96 \times 20$$
$$= \boxed{559.2}$$

Question -2 — 80% CI

$N = 25 \quad \sigma = 100 \quad \bar{x} = 520$

$\alpha = 1 - 0.8 \qquad \alpha/2 = 0.1$

$= 0.2$

$z\alpha_{/2} = z\alpha_{0.1}$

$= 1 - 0.1$

$= 0.90$

$= 1.29$

$LF = \bar{x} - 1.29 \times \frac{\sigma}{\sqrt{n}}$

$= 520 - 1.29 \times \frac{100}{\sqrt{25}}$

$= 520 - 1.29 \times 20$

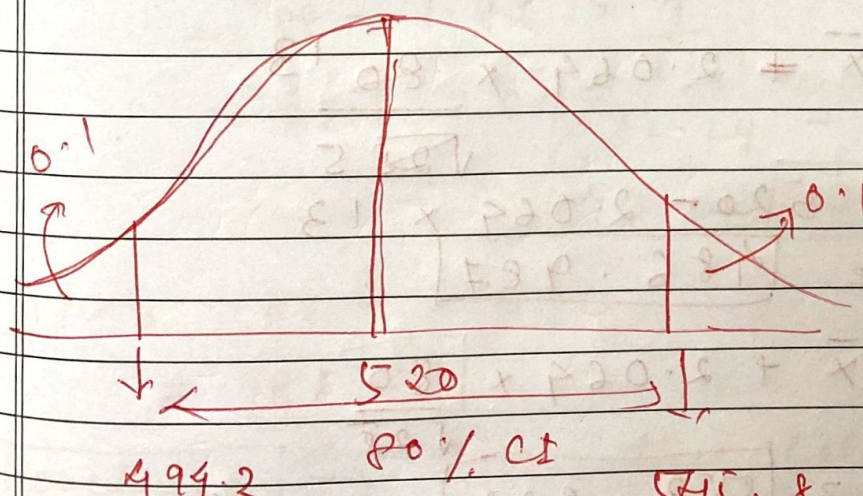
$= 520 - 25.8$

$= \boxed{494.2}$

$HF = \bar{x} + 1.29 \times \frac{\sigma}{\sqrt{n}}$

$= 520 + 25.8$

$= \boxed{545.8}$



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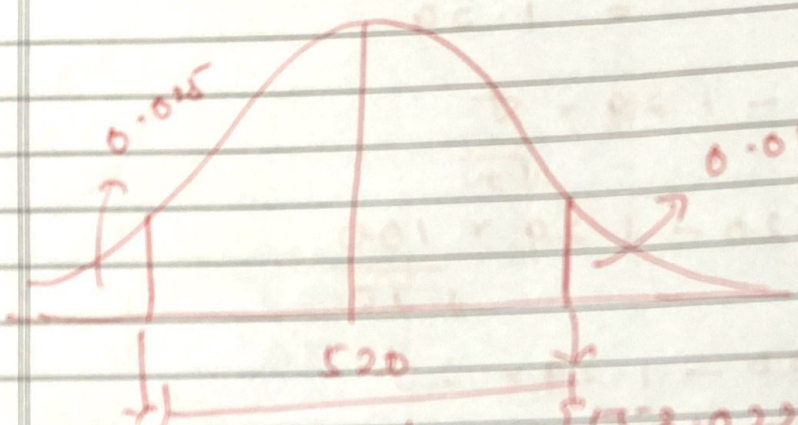
Question 3 – In the Quaid test of CAT exam a sample of 25 tests taken a mean of 520 with a sample SD = 80. Construct 95% CI above the mean

Ans $N = 25 \quad \bar{x} = 520 \quad S = 80 \quad CI = 95\%$

[(2 tailed T test) Since population SD not given and $N < 30$.]



$$\bar{x} \pm t_{\alpha/2}\left(\frac{S}{\sqrt{N}}\right)$$

Degree of freedom $= N - 1 = 24$

$$t_{\alpha/2} = \pm \frac{0.05}{2}, \pm 0.025 = 2.064$$

$$LF = \bar{x} - 2.064 \times \frac{80}{\sqrt{25}} \; 13$$

$$= 520 - 2.064 \times 13$$

$$= \boxed{486.987}$$

$$HF = \bar{x} + 2.064 \times \frac{80}{\sqrt{25}}$$

$$= \boxed{553.022}$$

Question:- Colleges in Toona A has 85% placement rate. A new college was recently opened and it was found out that a sample of 150 students had the placement rate of 88% with SD of 4%.

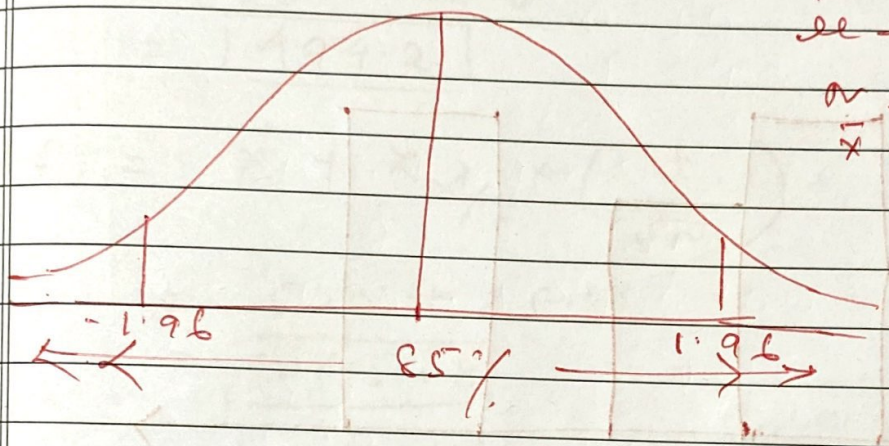
Does this college has a different placement rate with Confidence Interval = 95%.

$\mu = 85\%$

$n = 150$

$\bar{x} = 88\%$

$s = 4\%$



$\alpha = 0.05$

$\alpha/2 = 0.025$

$= 1.96$

$$\bar{x} \pm Z_{\alpha/2}\left(\frac{s}{\sqrt{n}}\right)$$

$$LF = 88 - 1.96\left(\frac{4}{\sqrt{150}}\right)$$

$$= 88 - 1.96 \times \frac{4}{12.24}$$

$$= 88 - 7.84/12.24 =$$

$$= 88 - 0.640 = \boxed{87.36}$$

$$HF = 88 + 0.640$$

$$= \boxed{88.64}$$

Conclusion → YES, this college has a different placement rate with 95% CI.