

Que 2) 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.

Ans

⇒ population standard deviation (σ) = 100

Sample size (n) = 25

Mean \bar{x} = 520

C.I = 80%.

C.I = point estimate \pm margin of error

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

Note: Because population standard deviation (σ) is given we need to perform - "Z test"

$$\text{Standard error} = \alpha = 1 - 0.8 \\ = 0.2$$

$$= Z \frac{0.2}{2} = 0.1$$

~~margin of error~~

$$Z_{\alpha/2} \text{ from } Z \text{ table} = \text{P-value} \\ 1 - 0.1 = 0.900$$

$$\text{value} = 1.34$$

$$\text{so } Z_{\alpha/2} = 1.34$$

now Lower fence = $\bar{x} - z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$

$$= 520 - \left(1.34 \times \frac{100}{\sqrt{25}} \right)$$

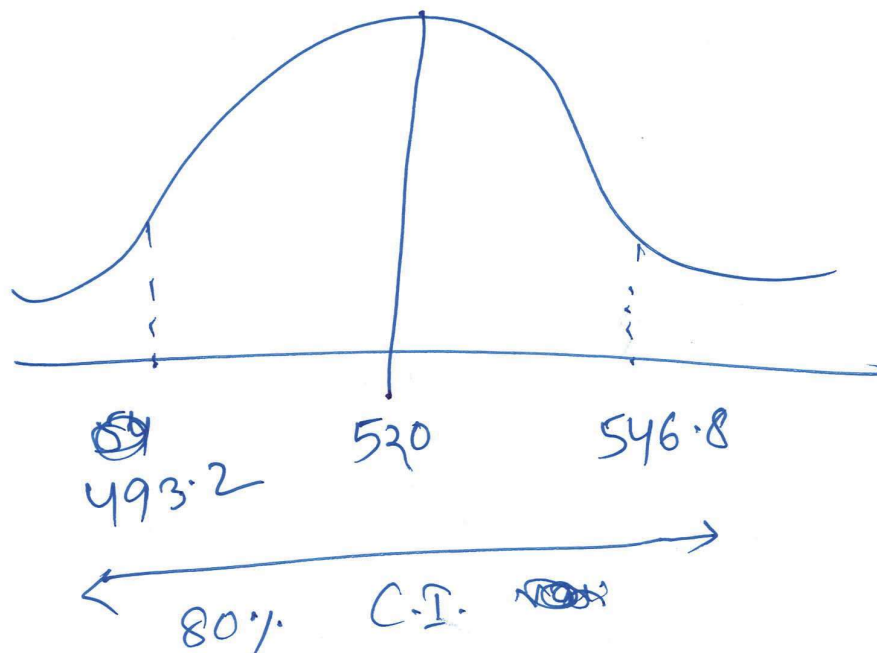
$$= 520 - 26.8$$

$$= 493.2$$

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

$$= 520 + 26.8$$

$$= 546.8$$



Que 3) A car believes that the percentage of citizens in city ABC that owns a vehicle is 60% or less. A sales manager disagrees with this. He conducted a hypothesis testing surveying 250 residents & found that 170 residents responded yes to owning a vehicle.

- State the null & alternate hypothesis.
- At a 10% significance level, is there enough evidence to support the idea that vehicle owner in ABC city is 60% or less.

Ans:

Null Hypothesis

$$p_0 \leq 60\%$$

$$H_1 > 60\%$$

$$n = 200, \quad x = 170,$$

$$\hat{p} = \frac{x}{n} = \frac{170}{200} = 0.85$$

$$q_0 = 1 - p_0 = 1 - 0.6 = 0.4$$

Z test with proportion

$$\Rightarrow Z_{test} = \frac{0.85 - 0.6}{\sqrt{\frac{0.6 \times 0.4}{200}}}$$

$$Z_{test} = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0 q_0}{n}}}$$

$$= 7.21$$

Decision boundary

$$\alpha = 0.1$$

$$\Rightarrow \beta = 1 - 0.1 = 0.9$$

~~80~~ value from Z table $= +1.3$

$$| 7.21 > 1.3 |$$

\Rightarrow Accept the null hypothesis

Que 4) What is the value of the 99 percentile?

2,2,3,4,5,5,5,6,7,8,8,8,8,9,9,10,11,11,12

$$\Rightarrow \text{Index value} = \frac{\text{percentile}}{100} \times (n+1)$$

$\{ n = \text{sample size} \}$

$$\Rightarrow \frac{99}{100} \times (20+1)$$

$$\approx 20.79 \text{ (Index)}$$

so value of 99 percentile

$$= 12.$$