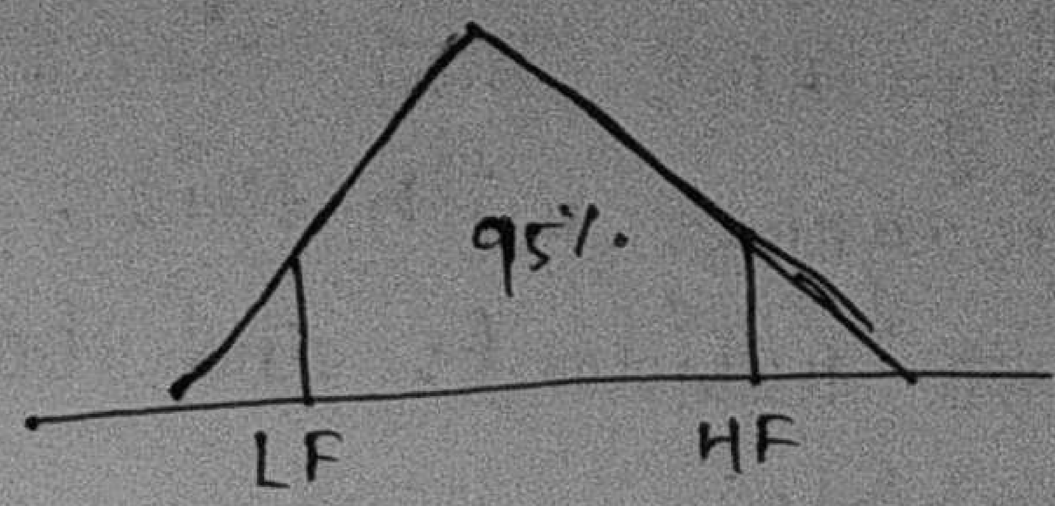
— : ASSIGNMENTS : —

1) $(s) = 80$, $\bar{x} = 520$, $CI = 95\%$, $\alpha = 0.05$, $n = 25$



t-test

degree of freedom $= df = n-1 = 25-1 = 24$

$\alpha = 0.05$

t-table $= 2.064$

Lower ference $= \bar{x} - t_{\alpha/2} \times \frac{s}{\sqrt{n}}$

$520 - 2.064 \times \cancel{\frac{80}{5}}\ 16$

$= 520 - 33.024$

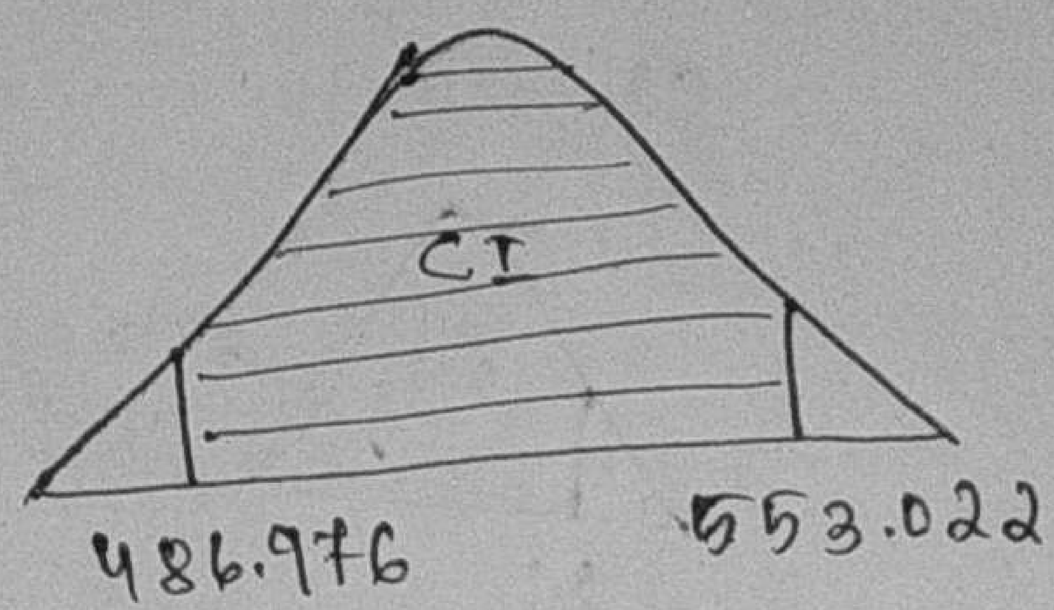
$= 486.976$

Higher ference $= \bar{x} + t_{\alpha/2} \times \frac{s}{\sqrt{n}}$

$520 + 2.064 \times 16$

$= 520 + 33.024$

$= 553.022$



2) Total employees (populat^n) = 1 lakh

Sample = 300 ⟶ XL $\qquad \alpha = 0.5$

200 ⟶ L $\qquad CI = 99.5$

HR asked how many XL, L t-shirts u need to order.

XL

$n = 300 \qquad \sqrt{n} = \sqrt{300} = 17.3$

$\bar{x} = 150.5$

$s = \sqrt{\frac{(x_i - \bar{x})^2}{n-1}} = \sqrt{\frac{(300-150.5)^2}{299}}$

$= \sqrt{74.75} = 8.64$

$\alpha = 0.5$

$df = 299$

t-table $= 0.67$

$LF = 150.5 - 0.67 \times \frac{8.64}{17.3}$

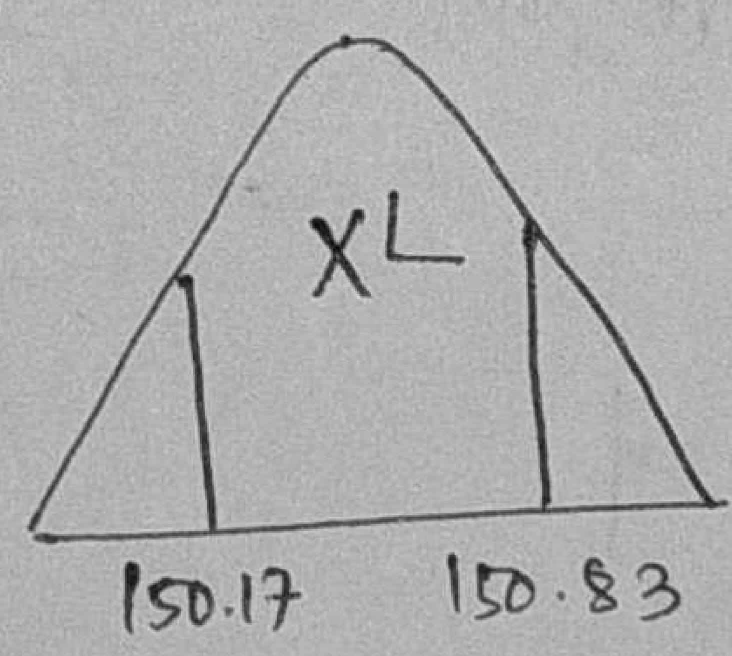
$= 150.5 - 0.33$

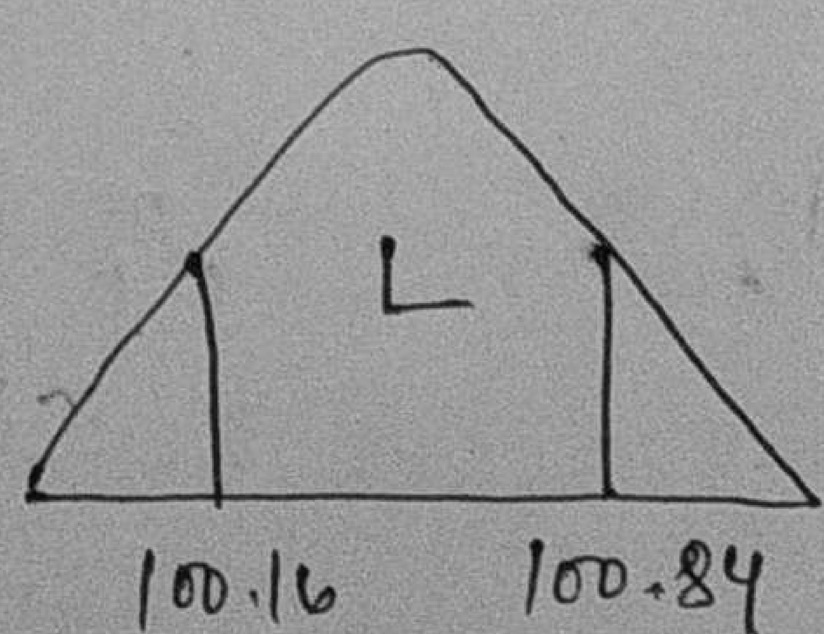
$= 150.17$

$HF = 150.5 + 0.67 \times \frac{8.64}{17.3}$

$= 150.5 + 0.33$

$= 150.83$





L

$n = 200 \qquad \sqrt{n} = \sqrt{200} = 14.14$

$\bar{x} = 100.5$

$s = \sqrt{\frac{(200-100.5)^2}{199}} = \sqrt{49.75}$

$= 7.05$

$\alpha = 0.5$

$df = n-1 = 200-1 = 199$

t-table $= 0.68$

$LF = 100.5 - 0.68 \times \frac{7.05}{14.14}$

$= 100.5 - 0.34$

$= 100.16$

$HF = 100.5 + 0.68 \times \frac{7.05}{14.14}$

$= 100.5 + 0.34$

$= 100.84$

(3) A car company believes that the percentage of residents in city ABC that owns a vehicle is 60% or less. A sales manager disagrees with this. He conducts a Hypothesis testing surveying 250 residents and found that 170 responded yes to owning a vehicle.

(a) State of H_0 & H_A

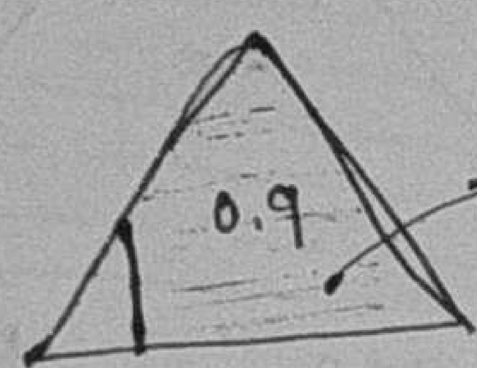
(b) At 10% significance level, is there enough evidence to support of idea that vehicle ownership in city ABC is 60%.

Ans (1) $H_0 : P_0 \geq 60\%$

$H_A : P_0 < 60\%$

(2) $\alpha = 10\% = 0.1$

$CI = 0.9$



0.9

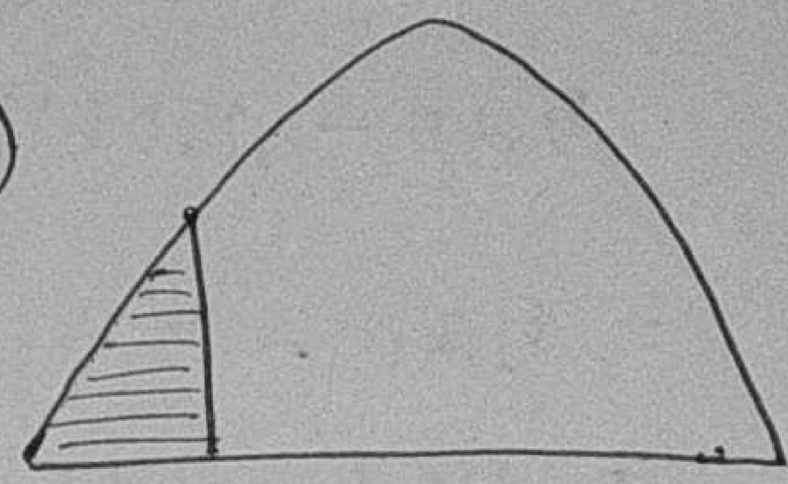
H_0 accepted

0.1

↓

-2.32

(3)



0.1

Z- table statistics

$Z_{0.1} = -2.32$

$n = 250$

$x = 170$

$\hat{P} = \frac{x}{n} = \frac{170}{250} = 0.68$

$P_0 = 60\% = 0.6$

$q_0 = 1 - P_0 = 0.4$

(4) Z-test with Proportion $= \frac{\hat{P} - P_0}{\sqrt{\frac{P_0 q_0}{n}}} = \frac{0.68 - 0.6}{\sqrt{\frac{0.6 \times 0.4}{250}}}$

$= \frac{0.08}{\frac{\sqrt{0.24}}{\sqrt{250}}}$ $\frac{\sqrt{0.24}}{\sqrt{250}} = \frac{0.49}{15.81}$ $= \frac{0.08 \times 15.81}{0.49}$

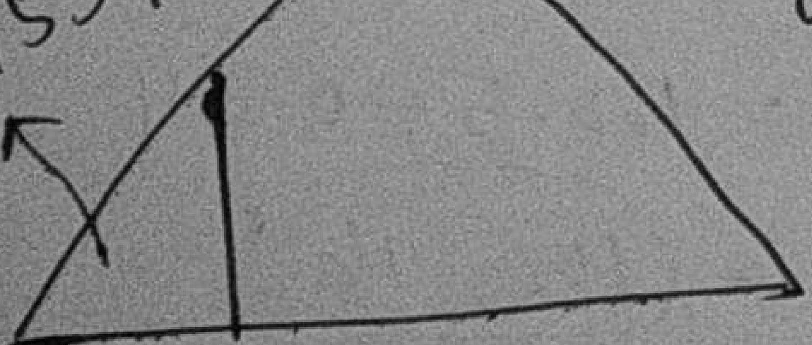
$= 2.6$ //

(5) Conclusion

$2.6 > -2.32$ = H_0 accepted

P-value Estimate :-

0.99534



+2.6

$\alpha = 0.1$

P-value $= 0.99534 > \alpha$

$= H_0$ is accepted

∴ Percentage of residents in city ABC that owns a vehicle is more than or equal to 60%.

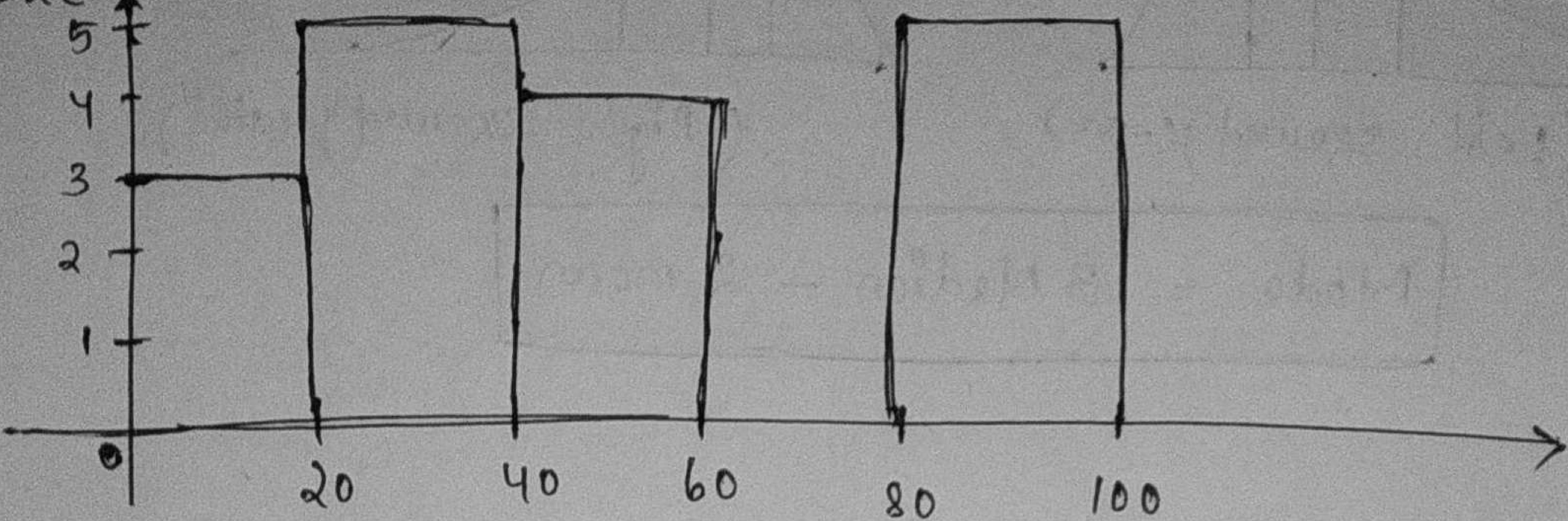
{Ans}

④ Plot a histogram

eg- { 10, 13, 18, 22, 27, 32, 38, 40, 45, 51, 56, 57, 88, 90, 92, 94, 99 }

bins = 5

bin size = 20



⑤ In the quant test of the CAT exam, the population standard deviat^{n} is known to be 100. A sample of 25 tests taken has a mean of 520. Construct an 80% CI about the mean.

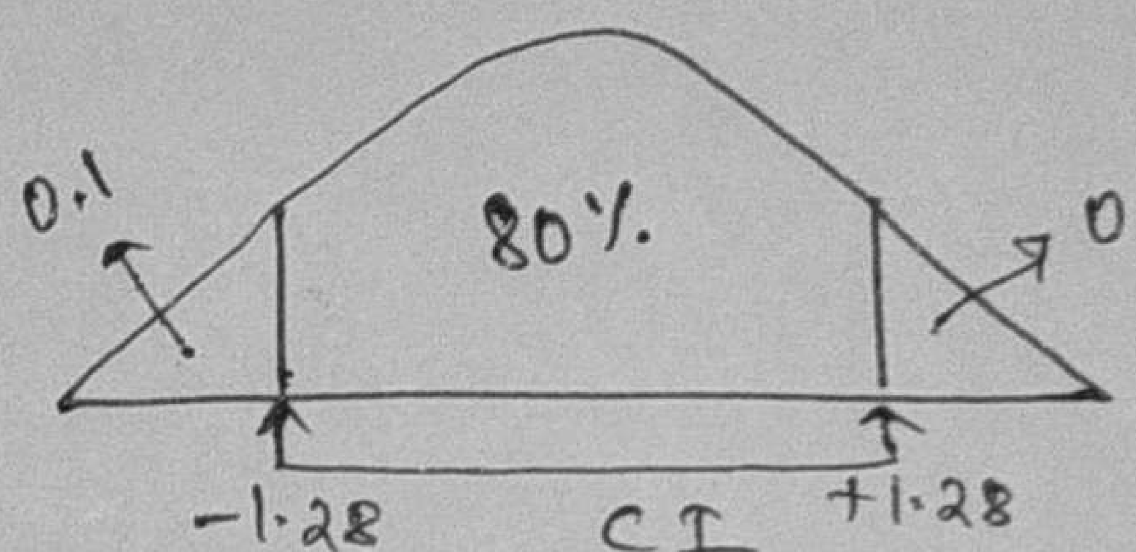
$\sigma = 100$

$n = 25$

$CI = 80\% = 0.8$

$\alpha = 0.2$

$\bar{x} = 520$



Point Estimate ± Margin of Error = Parameter

$$\bar{x} \pm Z_{\alpha/2} \times \frac{\sigma}{\sqrt{n}} = 520 \pm Z_{0.1} \times \frac{100}{5}$$

$Z_{0.1} \to \pm 1.28$

Lower ference $= 520 - 1.28 \times 20$

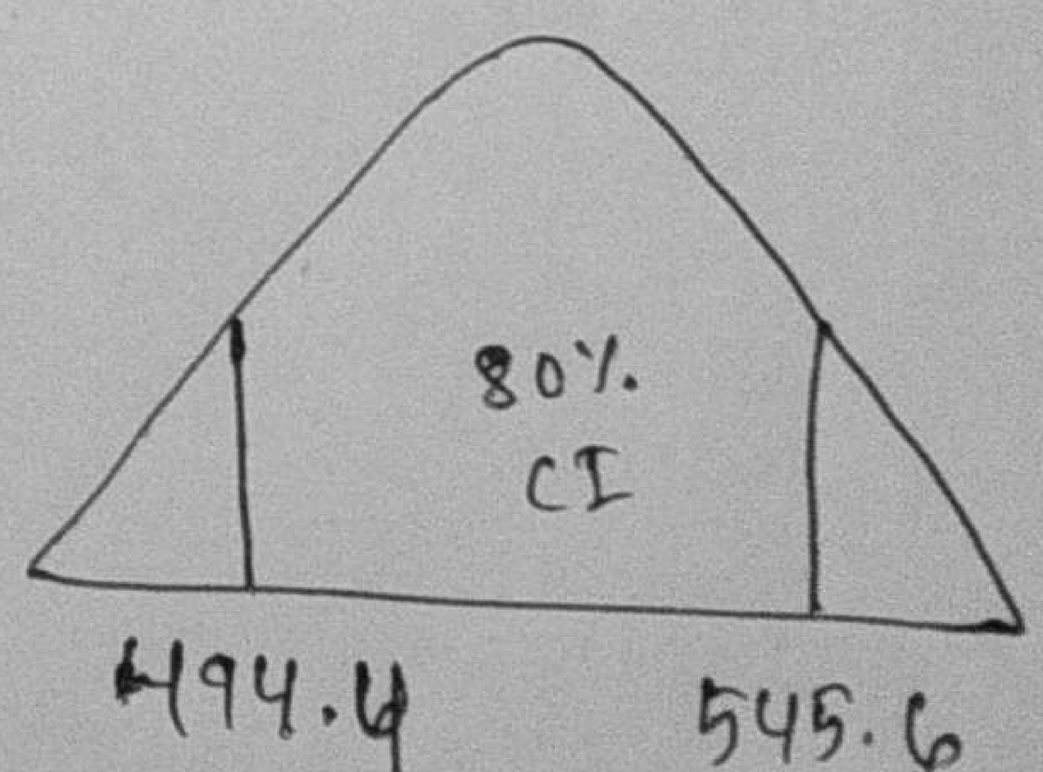
$= 520 - 25.6$

$= 494.4$

Higher ference $= 520 + 1.28 \times 20$

$= 520 + 25.6$

$= 545.6$



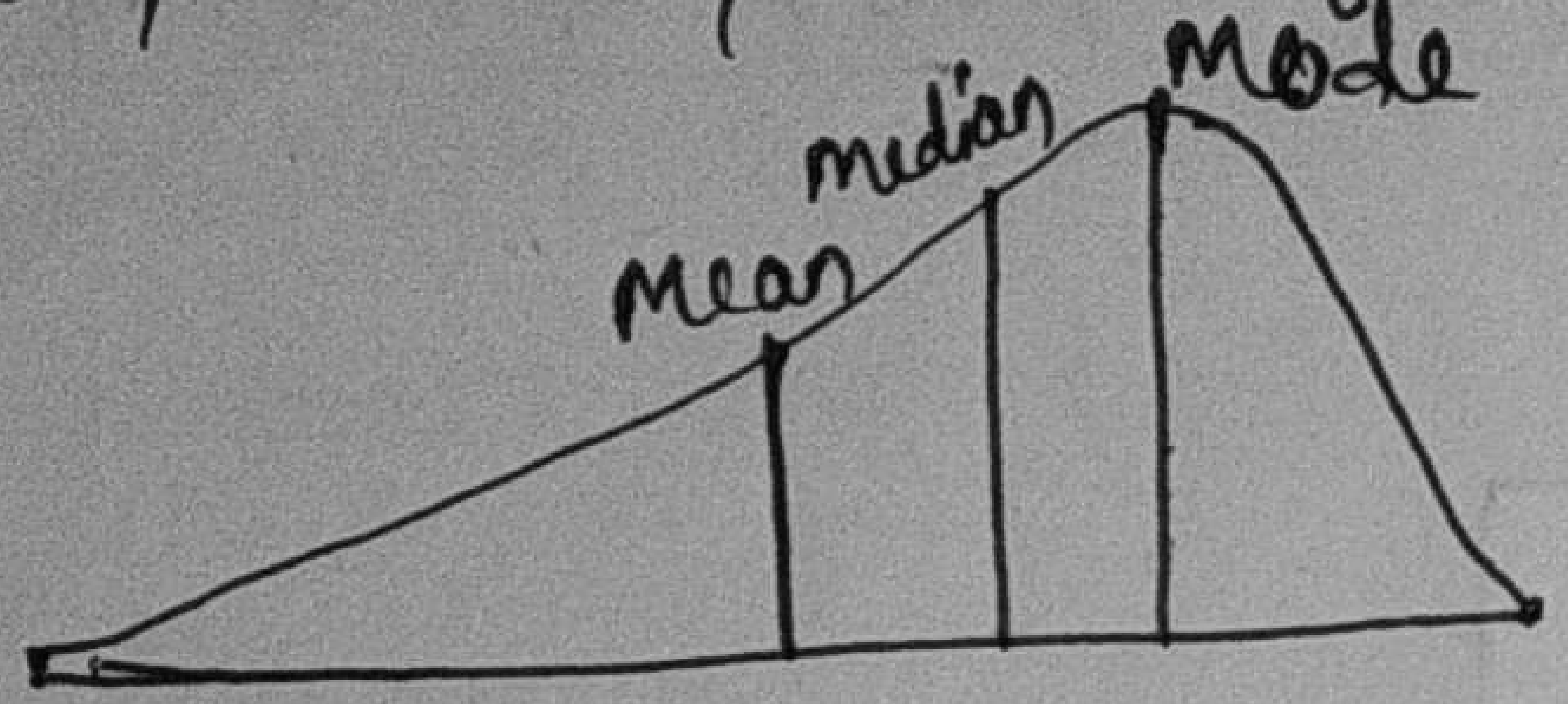
<Ans>

⑥ What is the value of the 99 percentile?

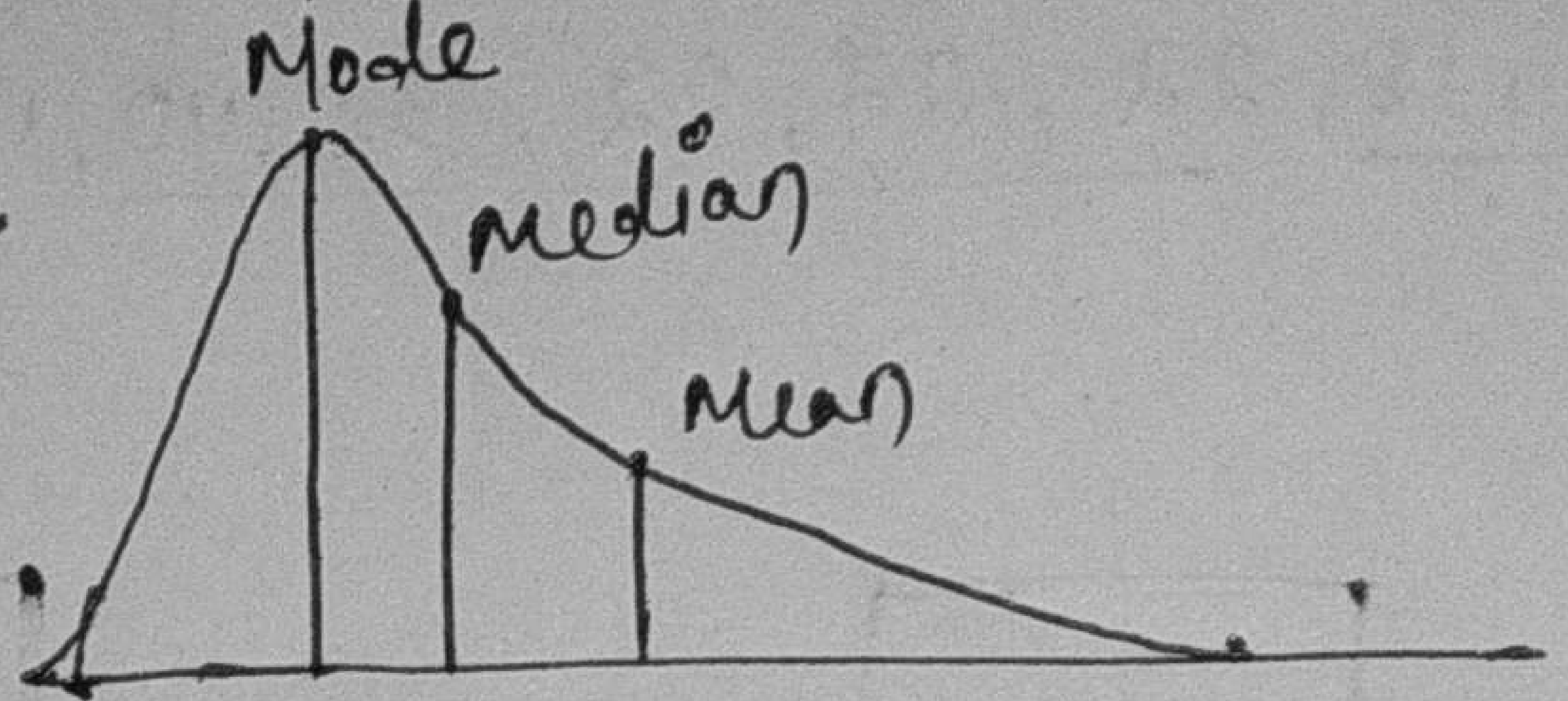
$x = \{2, 2, 3, 4, 5, 5, 5, 6, 7, 8, 8, 8, 8, 8, 9, 9, 10, 11, 11, 12\}$

$99\% = \frac{99}{100} \times (n+1) = \frac{99}{100} \times 21 = 20.79$ index $= 12$ value

(7) In left & right-skewed data, what is the relationship between mean, median & mode?



(Left skewed)(-ive)



(Right skewed) (+ive)

$$\boxed{\text{Mode} = 3\,\text{Median} - 2\,\text{mean}}$$