⑤

⁕ Normal Distribution -
$\{4,5,6,6,6,7,7,7,7,7,7,8,8,8,9,10\}$

$4\ 5\ 6\ 7\ 8\ 9\ 10$
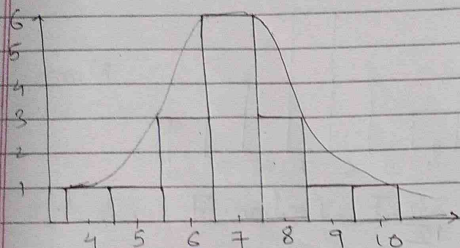
Mean = 7, Median = 7, mode = 7
            mean = median = mode

⁕ Right skewed -   ⁕ Left skewed
$\{6,7,7,7,7,8,8,8,9,10\}$

Mean = $\dfrac{77}{10}$ = 7·7

$\{4,5,6,6,6,7,7,7,7,8\}$ Mean = $\dfrac{63}{10}$
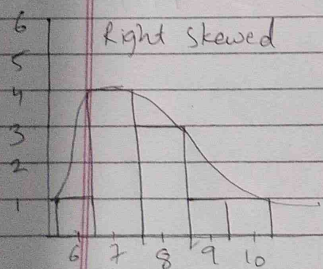
Right skewed   Left skewed = 6·3

$6\ 7\ 8\ 9\ 10$ $4\ 5\ 6\ 7\ 8$
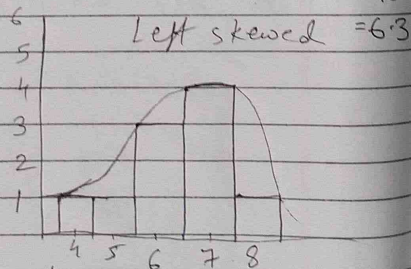
Mean = 7·7, median = 7·5, mode = 7 | Mean = 6·3, Median = 6·5, Mode = 7
mean > median > mode. | mean < median < mode.

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④   What is the value of the 99 percentile?

$2,2,3,4,5,5,5,6,7,8,8,8,8,8,9,9,10,11,11,\boxed{12}$
                                                    ↑
                                              99 percentile

99ᵗʰ percentile = $\dfrac{99}{100} \times (n+1)$

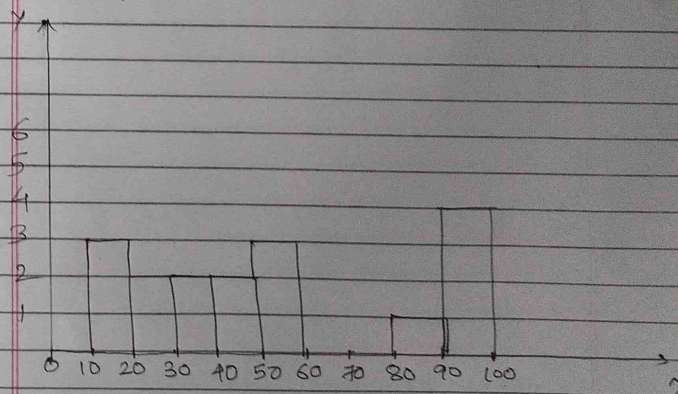= $\dfrac{99}{100} \times (20+1)$ = $\dfrac{99}{100} \times (21)$

= 20·79 index

99 percentile = 12

① Plot a histogram
10, 13, 18, 22, 27, 32, 38, 40, 45, 51, 56, 57, 88,
90, 92, 94, 99.

$0\ 10\ 20\ 30\ 40\ 50\ 60\ 70\ 80\ 90\ 100$

② In a great 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 a 80% CI about the Mean.

$n = 25, \sigma = 100, \bar{x} = 520, CI = 80\%$

$\alpha = 1 - 0.80$

$\alpha = 0.2$

0.1   0.1

Lower   520   Higher (545.7)
Fence   Fence
(494.3)

Z-Test = Point estimate ± Margin of Error

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

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

$520 + Z_{0.2/2} \frac{100}{\sqrt{25}}$ $520 - Z_{0.2/2} \frac{100}{\sqrt{25}}$

$520 + Z_{0.1} \frac{100}{5}$ $520 - Z_{0.1} \frac{100}{5}$

$520 + 1.285 \times 20$ $520 - 1.285 \times 20$

$= 494.4$ Lower = 494.3
Higher = 545.7   fence
fence

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

a) State the null & alternate Hypothesis.

b) At a 10% significance level, is there enough evidence to support the idea that vehicle owners in ABC city is 60% or less.

① Null Hypothesis $H_0 = P_0 \leq 60\%$

$H_1 = P_0 > 60\%$

② $n = 250, x = 170$

$\alpha = 0.900$

$+0.9 = 0.1$

$= 1.285$

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

$q_0 = 1 - P_0 = 1 - 60\%$

$= 0.4$

③

Accept   Reject null
                Hypothesis

2.33 $Z_{test} = \frac{\hat{P} - P_0}{\sqrt{\frac{P_0 q_0}{n}}}$

1.285   1.285 $= \frac{0.68 - 0.60}{\sqrt{\frac{60 \times 0.4}{250}}}$

Accept   2.33 < 2.59

Reject the null Hypothesis