Q② $n = 1000$ $\bar{x} = 170\,cm$ $\sigma = 10\,cm$

Data is normally Distributed (given)

@ what % of individual having height b/w 160cm to 180 cm

Z-score corresponding to 160 & 180

$$Z_{160} = \frac{x_i - \mu}{\sigma} = \frac{160 - 170}{10} = -1$$ @

$$\boxed{Z_{160} = -1}$$

similarly

$$Z_{180} = \frac{180 - 170}{10} = +1$$ ⑤

$$\boxed{Z_{180} = +1}$$

using z-table probability associated with @
& ⑤ are

$$P(Z_{160} = -1) = 0.15866$$

$$P(Z_{180}) = 0.84134$$

The % of individual having height b/w 160 & 180cm

$$P(160 < height < 180) = 0.84134 - 0.15866$$

$$= 0.68$$

68% people have hight b/w 160 & 180 cm

(b) If 100 individuals are selected Randomly from dataset, what is the probability that their avg. height is greater than 175cm?

— There are total 1000 Individuals and oot of them 100 were Randomly selected. Therefore as by "Centere Limit Theorem" the sample data with mean will folloo Gaussian Dist.

mean of sample ≈ mean of population

Even if we try to calculate it will fall close to it →→ How?

Point estimate ± Margin of Error = Parameter

⇒ sample mean ± Margin of error = pop. mean

if we let $\alpha = 5\%$.
⇒ Sample Mean ± 1.96 = 170

which will be approximately equal to 170

S.D.
$$Z\text{-Score} = \frac{x_i - \bar{x}}{\frac{\sigma}{\sqrt{n}}}$$ } standard error in care of whole pop, when n = 1

$$Z_{175} = \frac{175 - 170}{\frac{10}{\sqrt{100}}} = 5$$

2 score = 5 means height above 175cm is very rare. It prorop will approximately will be
0

— note

the extreme value in 2-score which means prorop of getting value less than 4.09 is 0.99998 is 1. However prorop. of getting value greater than 4.09 is approx. equal to 0.

© Z-score corresponding to height of 185cm

$$Z = \frac{x_i - \bar{x}}{\frac{S}{\sqrt{n}}} = \frac{x_i - \bar{x}}{\sigma} \qquad n = 1 \quad \text{for all data}$$

$$= \frac{185 - 170}{10} = \frac{15}{10} = 1.5$$

$$\boxed{Z_{185} = 1.5}$$

$$P(Z_{185}) = 0.93319$$

$$\boxed{93.31\%}$$

— prorop. associated with 2-score by 2-tabu

(d) we know that 5% of dataset has height below a certain value. what is the approximate height corresponding to that threshold?

Z-score corresponding to 5%.

using z-table = -1.64

Since, $Z\text{-score} = \dfrac{x_i - \bar{x}}{\sigma}$

$$-1.64 = \dfrac{x_i - 170}{10}$$

$$\Rightarrow x_i = 170 - 16.4$$

$$\boxed{x_i = 153.6 \text{ cm}}$$

(e) calculate coefficient of variation for dataset
- compare S.D. of Data set with its mean

$$\boxed{CV = \dfrac{\sigma}{\mu} \times 100}$$

$$\Rightarrow CV = \dfrac{10}{170} \times 100$$

$$\boxed{CV = 5.88}$$

(f) Calc. Skewness of dataset and interpret the result.

→ it is given in question that the data set have Skewness approximately equal to zero. that means data set is symmetric.