Standard Normal Distribution And Z-Score

Z-stats

Normally Distributed
↓

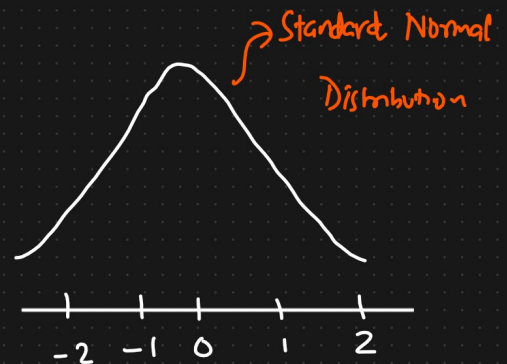$X = \{1, 2, 3, 4, 5\}$ $\mu = 3$

$\sigma = 1.414 \approx 1$

→ Normal Distribution

$\Rightarrow$ $\mu = 0$
$\sigma = 1$

→ Standard Normal Distribution

$X \underset{\sim}{\sim} SND(\mu = 0, \sigma = 1)$

$$Z\text{-score} = \frac{x_i - \mu}{\sigma}$$

$$= \frac{1-3}{1} = -2 \qquad \frac{4-3}{1} = \boxed{1}$$

$$= \frac{2-3}{1} = -1 \qquad \frac{5-3}{1} = 2$$

$$= \frac{3-3}{1} = 0$$

①

Area Under the curve
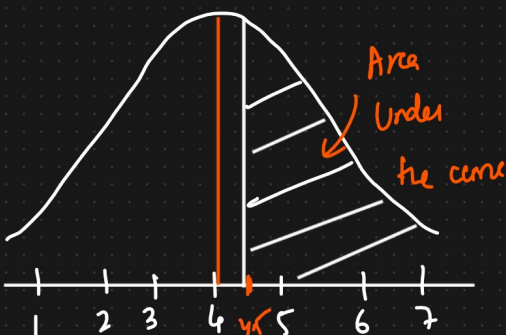
$\left.\begin{array}{l} \mu = 4 \\ \sigma = 1 \end{array}\right\}$

① How many standard deviation 4.5 is away from mean?

$$x_i = 4.5$$

$$z\text{-score} = \frac{4.5 - 4}{1} = 0.5$$

Question :

$$\mu = 4 \qquad \sigma = 1$$

What percentage of data is falling above 4.5?

$$z\text{-score} = \frac{4.5 - 4}{1}$$

$$= 0.5$$

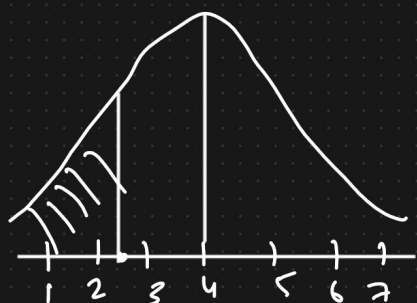$$\begin{array}{r} 1.0000 \\ 0.69146 \\ \hline 0.30854 \end{array}$$

$$\boxed{0.69146} \Rightarrow 69.146$$

Area under the curve $(\geq 4.5) = 1 - 0.69146$

$$= 0.30854$$

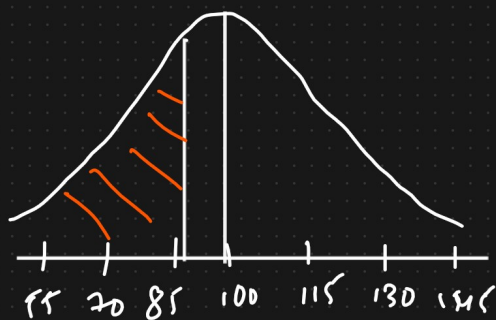$$= 30.85\%$$

✴ What percentage of data is falling below 2.5?

$$z\text{-score} = \frac{2.5 - 4}{1} = -1.5$$

Area under the curve $(\leq 2.5) = 0.06681$

$$= 6.6\%$$

Prob) In India the average IQ is 100, with a standard deviation of 15. What is the percentage of the population would you expect to have an IQ lower than 85?

Ans) $\mu = 100$ $\sigma = 15$ $x_i = 85$

① z score $= \dfrac{x_i - \mu}{\sigma}$

$$= \dfrac{85 - 100}{15}$$

$$= -1 /.$$

Area under the curve $= 0.15866$

$$= 15.866$$

Area under the curve $(\geq 85) = 1 - 0.15866$

$$= \approx 84\%$$