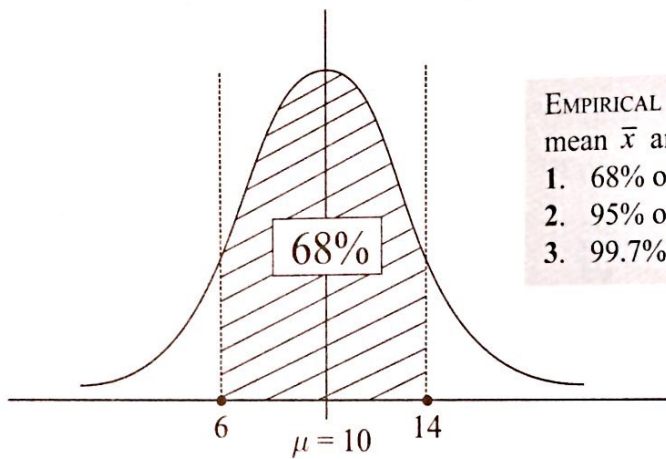## Question 4 (25 marks)

Empirical Rule: In any normal distribution with mean $\bar{x}$ and standard deviation σ.
1. 68% of the data falls within 1σ of the mean $\bar{x}$.
2. 95% of the data falls within 2σ of the mean $\bar{x}$.
3. 99.7% of the data falls within 3σ of the mean $\bar{x}$.

Question 4 (a) (i)

Standard deviation = 4
Median = 10

Question 4 (a) (ii)

$$x = 10 : z = \frac{10-10}{4} = 0$$

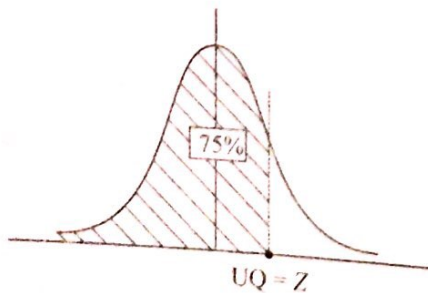$$x = 14 : z = \frac{14-10}{4} = 1$$

$$x = 6 : z = \frac{6-10}{4} = -1$$

$$z = \frac{x - \mu}{\sigma}$$

Question 4 (b)

The standard normal distribution has a mean of **0** and standard deviation of **1** and has the same shape and area distribution as the original normal distribution.
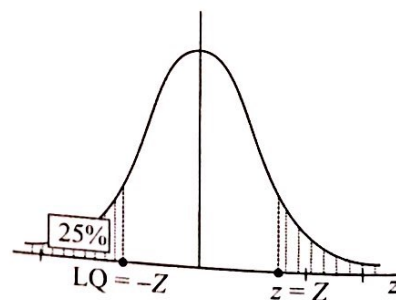
Question 4 (c) (i)

$P(z < Z) = 0.75$

$\therefore z = 0.68 = \dfrac{x-10}{4}$

$2.72 = x - 10$

$\therefore x = 12.72$ (Upper Quartile)

Question 4 (c) (ii)

$z = -0.68 = \dfrac{x-10}{4}$

$-2.72 = x - 10$

$\therefore x = 7.28$ (Lower Quartile)

Question 4 (c) (iii)

Interquartile range = UQ – LQ = 12.72 – 7.28 = 5.44