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### Tutorial-6 (PS)

Ans1 For Poisson distribution probability mass function (pmf) of random variable is defined

$$P(x) = \frac{\lambda^x e^{-\lambda}}{x!}$$

$\therefore$  Mean of Poisson distribution is equal to rate parameter  $\lambda = 2$ .

Here we have  $\lambda = 2$  &  $P(x) = \frac{2^x e^{-2}}{x!}$

Probability of accidents in a month is equal to two,  $x=2$

$$\therefore P(x=2) = \frac{2^2 e^{-2}}{2!}$$

$$\therefore P(x=2) = \frac{2}{e^2}$$

$$P(x=2) = 0.2707$$

Ans2  $\therefore P(x) = \frac{\lambda^x e^{-\lambda}}{x!}$

Given,  $P(1) = 2P(2)$

$$\frac{1 e^{-\lambda}}{1} = 2 \cdot \frac{\lambda^2 e^{-\lambda}}{2!}$$

$$\therefore \lambda = 2 \cdot \frac{\lambda^2}{2}$$

$$\lambda(\lambda-1) = 0$$

$$\lambda = 0, \lambda = 1$$

$$\text{If } \lambda = 1 \text{ then } P(3) = \frac{1^3 e^{-1}}{3!}$$

$$\therefore P(3) = \frac{1}{6e}$$

Ans 3 Standard normal variable,  $Z = \frac{x - \text{mean}}{\text{S.D.}}$

$$\text{When } x = 18 \Rightarrow Z = \frac{x - \text{mean}}{\text{S.D.}} = \frac{18 - 15}{3} = 1$$

Now,

$$\begin{aligned} P(x \geq 18) &= P(Z \geq 1) \\ &= P(0 < Z < \infty) - P(0 < Z < 1) \\ &= 0.5 - 0.3413 \\ \therefore P(x \geq 18) &= 0.1587 \end{aligned}$$

Ans 4 Z score =  $\frac{\text{Value} - \text{mean}}{\text{S.D.}}$

$$\text{Value} = 48$$

$$Z_{\text{score}} = \frac{42 - 48}{8} = -0.75$$

Z score corresponds to 0.75 = 0.7734 or 77.34% in Question Area corresponding to  $Z = 0.75$  is 0.2734 ( $\geq 50\%$ )

$$\text{Hence } 0.5 + 0.2734 = 0.7734$$

$\therefore 0.7734$  students less than 48 marks.

Total students = 450

$$\Rightarrow \text{Students less than 48 marks} = 450 \times 0.7734 \\ = 348.03$$

$\therefore$  No. of students ( $\leq 48$  marks) = 348

Ans

As we know,  $Z = \frac{x - \mu}{\sigma}$

$$P(26 < x < 40)$$

$$Z = \frac{40 - 30}{5} = 2$$

$$Z = \frac{26 - 30}{5} = -0.8$$

$$\therefore P(26 < x < 40) = 0.97725 - 0.21186 \\ = 0.76539$$