

4)

Claim Size	Probability
20	0.15
30	0.1
40	0.05
50	0.2
60	0.1
70	0.1
80	0.3

$$E(X) = \sum_{i=1}^{\infty} X_i P_i$$

$$\begin{aligned} \Rightarrow \text{mean} = E(X) &= 20 \times 0.15 + 30 \times 0.1 \\ &\quad + 40 \times 0.05 + 50 \times 0.2 \\ &\quad + 60 \times 0.1 + 70 \times 0.1 + 80 \times 0.3 \\ &= 55 \end{aligned}$$

$$\Rightarrow \text{st. dev.} = \sqrt{\text{Var}(X)} = \sqrt{E(X^2) - E(X)^2}$$

$$\begin{aligned} E(X^2) &= 20^2 \times 0.15 + 30^2 \times 0.1 + 40^2 \times 0.05 + 50^2 \times 0.2 \\ &\quad + 60^2 \times 0.1 + 70^2 \times 0.1 + 80^2 \times 0.3 = 3500 \end{aligned}$$

$$\text{st. dev.} = \sqrt{3500 - 55^2} \approx 21.79$$

$$\Pr(\text{mean} - \text{st. dev.} \leq X \leq \text{mean} + \text{st. dev.})$$

$$= \Pr(55 - 21.79 \leq X \leq 55 + 21.79)$$

$$= \Pr(33.21 \leq X \leq 76.79)$$

$$= \Pr(40) + \Pr(50) + \Pr(60) + \Pr(70)$$

$$= 0.05 + 0.2 + 0.1 + 0.1 = 0.45 \quad \boxed{A}$$