

$$P(X = -5) = \frac{1}{3}$$

$$P(X = 0) = \frac{1}{3}$$

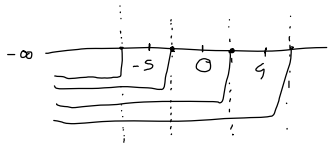
$$P(X = 4) = \frac{1}{3}$$

1)

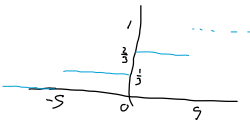
$$F_X(x)$$

$$F_X(x) = P(X \leq x) = P(\omega \in \Omega : X(\omega) \leq x) \quad \text{per } \forall x \in \mathbb{R}$$

$$F_X(x) = \begin{cases} 0 & x < -5 \\ \frac{1}{3} & -5 \leq x < 0 \\ \frac{2}{3} & 0 \leq x < 4 \\ 1 & x \geq 4 \end{cases}$$



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①

$$\begin{aligned} E(X) &= \sum_{i: x_i \in S} x_i \cdot p_X(x_i) \\ &= x_1 \cdot p(x_1) + x_2 \cdot p(x_2) + x_3 \cdot p(x_3) \\ &= -5 \cdot \frac{1}{3} + 0 \cdot \frac{1}{3} + 4 \cdot \frac{1}{3} \\ &= \frac{-5}{3} + 0 + \frac{4}{3} \\ &= -\frac{1}{3} \end{aligned}$$

Var, 14 20

$$\begin{aligned} \text{Var}(X) &= \sum_{i=1}^K (x_i - E(X))^2 p_i \\ &\text{oppure} \sum_{i=1}^K x_i^2 p_i - E(X)^2 \end{aligned}$$

$$\begin{aligned} \text{Var}(X) &= \left(-5 + \frac{1}{3}\right)^2 \cdot \frac{1}{3} + \left(0 + \frac{1}{3}\right)^2 \cdot \frac{1}{3} + \left(4 + \frac{1}{3}\right)^2 \cdot \frac{1}{3} \\ &= \left(-\frac{14}{3}\right)^2 \cdot \frac{1}{3} + \frac{1}{9} \cdot \frac{1}{3} + \left(\frac{13}{3}\right)^2 \cdot \frac{1}{3} \\ &= \frac{196}{9} \cdot \frac{1}{3} + \frac{1}{27} + \frac{169}{9} \cdot \frac{1}{3} \\ &= \frac{196}{27} + \frac{1}{27} + \frac{169}{27} = \\ &= \frac{366}{27} \end{aligned}$$

$$= \frac{122}{9}$$

$$y = aX + b$$

$$P(y = -5a + b) = \frac{1}{3}$$

$$P(y = b) = \frac{1}{3}$$

$$P(y = 4a + b) = \frac{1}{3}$$

Media

① $a > 0$

$$E_x = (-5a + b) \cdot \frac{1}{3} + b \cdot \frac{1}{3} + (4a + b) \cdot \frac{1}{3}$$

$$= \frac{-5a + b}{3} + \frac{b}{3} + \frac{4a + b}{3}$$

$$= -\frac{5a}{3} + \frac{b}{3} + \frac{b}{3} + \frac{4a}{3} + \frac{b}{3}$$

$$= \frac{-5a + 4a + 3b}{3}$$

$$= \frac{-a + 3b}{3}$$

VARIANZA

$$\left(-5a + b - \left(\frac{-a + 3b}{3} \right) \right)^2 \cdot \frac{1}{3} + \left(b - \left(\frac{-a + 3b}{3} \right) \right)^2 \cdot \frac{1}{3} + \left(4a + b - \left(\frac{-a + 3b}{3} \right) \right)^2 \cdot \frac{1}{3}$$

$$\left(\frac{-15a + \cancel{3b} + a - \cancel{3b}}{3} \right)^2 \cdot \frac{1}{3} + \left(\frac{\cancel{3b} + a - \cancel{3b}}{3} \right)^2 \cdot \frac{1}{3} + \left(\frac{12a + \cancel{3b} + a - \cancel{3b}}{3} \right)^2 \cdot \frac{1}{3}$$

$$= \frac{196a^2}{9} \cdot \frac{1}{3} + \frac{a^2}{9} \cdot \frac{1}{3} + \frac{169a^2}{9} \cdot \frac{1}{3}$$

$$= \frac{196a^2}{27} + \frac{a^2}{27} + \frac{169a^2}{27}$$

$$= \frac{366a^2}{27}$$

$$= \frac{122a^2}{9}$$

$$E_x = b \cdot \frac{1}{3} + b \cdot \frac{1}{3} + b \cdot \frac{1}{3}$$

$$= \frac{b}{3} + \frac{b}{3} + \frac{b}{3}$$

$$= \frac{3b}{3}$$

$$= b$$

VARIANZA

$$\left(b - b \right)^2 \cdot \frac{1}{3} + \left(b - b \right)^2 \cdot \frac{1}{3} + \left(b - b \right)^2 \cdot \frac{1}{3}$$

$$= 0 \cdot \frac{1}{3} + 0 \cdot \frac{1}{3} + 0 \cdot \frac{1}{3}$$

$$= 0$$

c) $a < 0$

$$Ex = (5a + b) \cdot \frac{1}{3} + \frac{b}{3} + (-4a + b) \cdot \frac{1}{3}$$

$$= \frac{(5a + b)}{3} + \frac{b}{3} + \frac{(-4a + b)}{3}$$

$$= \frac{5a + b + b + b - 4a}{3}$$

$$= \frac{a + 3b}{3}$$

V
ARIANZA

$$\text{VAR}(X) = \left(5a+b - \left(\frac{a+3b}{3} \right) \right)^2 \cdot \frac{1}{3} + \left(b - \left(\frac{a+3b}{3} \right) \right)^2 \cdot \frac{1}{3} + \left(-4a+b - \left(\frac{a+3b}{3} \right) \right)^2 \cdot \frac{1}{3}$$

$$= \left(\frac{15a + \cancel{3b} - a - \cancel{3b}}{3} \right)^2 \cdot \frac{1}{3} + \left(\frac{\cancel{3b} - a + \cancel{3b}}{3} \right)^2 \cdot \frac{1}{3} + \left(\frac{-12a + \cancel{3b} - a - \cancel{3b}}{3} \right)^2 \cdot \frac{1}{3}$$

$$= \frac{196a^2}{9} \cdot \frac{1}{3} + \frac{a^2}{9} \cdot \frac{1}{3} + \frac{169a^2}{9} \cdot \frac{1}{3}$$

$$= \frac{196a^2}{27} + \frac{a^2}{27} + \frac{169a^2}{27}$$

$$= \frac{366a^2}{27}$$

$$= \frac{122}{9} a^2$$