

## Esercizio 2

venerdì 14 maggio 2021 18:15

$X$  v.a. DISCRETA

Valori di  $X = -5, 0, 5$

$$p(X = -5) = 0.2$$

$$p(X = 0) = 0.6$$

$$p(X = 5) = c$$

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① Valore di  $c$

$$c = 1 - 0.2 - 0.6$$

$$= 0.2$$

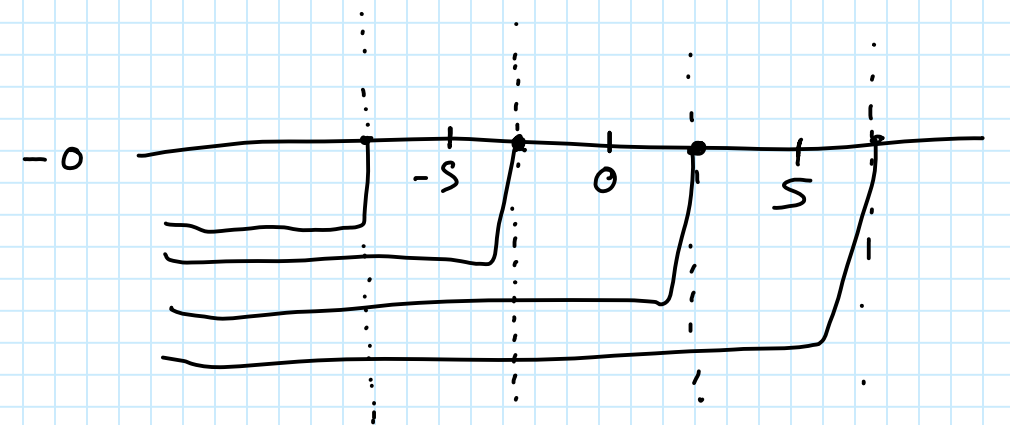
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②

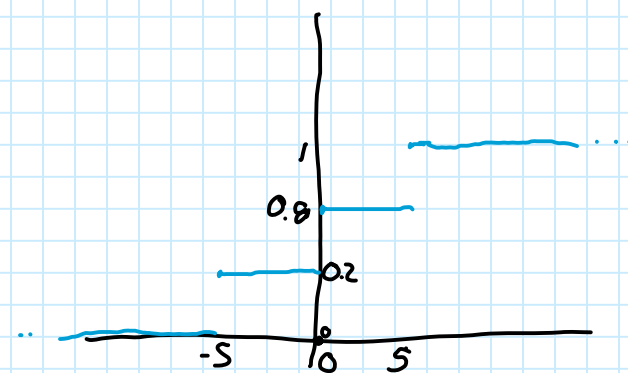
$$F_X(x)$$

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

$$F_X(x) = \begin{cases} P(\emptyset) = 0 & x < -5 \\ P(-5) = 0.2 & -5 \leq x < 0 \\ P(-5) + P(0) = 0.8 & 0 \leq x < 5 \\ P(\Omega) = 1 & x \geq 5 \end{cases}$$



Gráfico



③

Media

$$E(X) = \sum_{p: x_p \in S} x_p \cdot p_X(x_p)$$

$$\begin{aligned} & x_1 \cdot p(x_1) + x_2 \cdot p(x_2) + x_3 \cdot p(x_3) \\ &= -5 \cdot 0.2 + 0 \cdot 0.6 + 5 \cdot 0.2 \\ &= -1 + 0 + 1 \end{aligned}$$

$$= 0$$

Varianza

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

oppure

$$\sum_{i=1}^K x_i^2 p_i - E(X)^2$$

$$\text{Var}(X) = (-5-0)^2 \cdot 0.2 + (0-0)^2 \cdot 0.6 + (5-0)^2 \cdot 0.2$$

$$= 25 \cdot 0.2 + 0 + 25 \cdot 0.2$$

$$= 5 + 0 + 5$$

$$= 10$$

9

$$Y = X^2$$

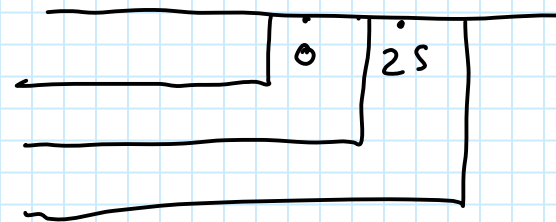
$x^2 = \bar{e}$  STRETTAMENTE MONOTONA

$$P(Y=0) = P(X^2=0) = P(X=0) = 0.6$$

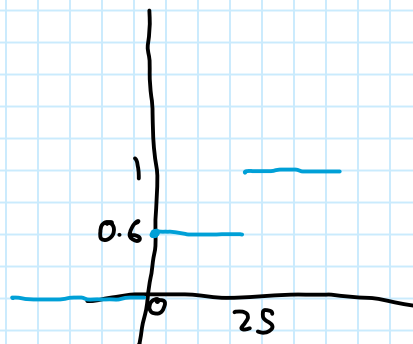
$$P(Y=25) = P(X^2=25) = P(X=5) + P(X=-5) = 0.2 + 0.2 = 0.4$$

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

$$F_Y(y) = \begin{cases} 0 & y < 0 \\ 0.6 & 0 \leq y < 1 \\ 1 & y \geq 1 \end{cases}$$



GRAFICO



⑤

$$E(Y) = 0 \cdot 0.6 + 25 \cdot 0.4$$
$$= 10$$

$$\text{Var}(Y) = \sum_{i=1}^4 (y_i - E(Y))^2 \cdot p_i$$

$$\text{Var}(Y) = (0 - 10)^2 \cdot 0.6 + (25 - 10)^2 \cdot 0.4$$
$$= 100 \cdot 0.6 + 225 \cdot 0.4$$
$$= 60 + 90$$
$$= 150$$