

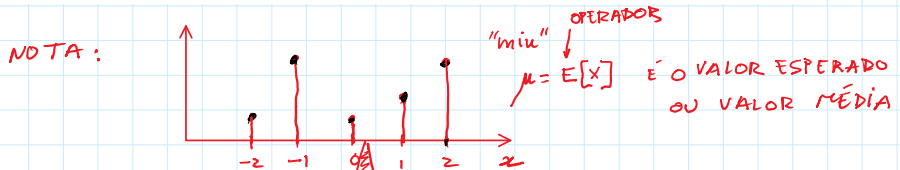
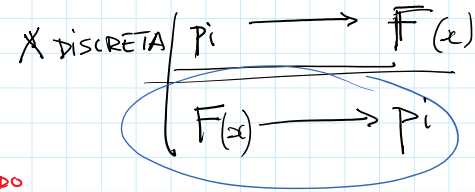
2.26. Seja  $X$  uma variável aleatória discreta com a seguinte distribuição de probabilidades: (ou FUNÇÃO MASSA DE PROBABILIDADES)

$x_i$	-2	-1	0	1	2
$P[X = x_i]$	0.1	0.3	0.1	0.2	0.3

VALORES QUE PODE TO MAR X  
PROBABILIDADES

- a) Calcule  $E[X]$  e  $Var[X]$ .
- b) Determine a função distribuição cumulativa de  $X$ .  $F(x)$
- c) Calcule  $P(X \geq 0 | X < 2)$ .
- d) Determine a distribuição de probabilidades da variável aleatória  $Y = X^2$ .

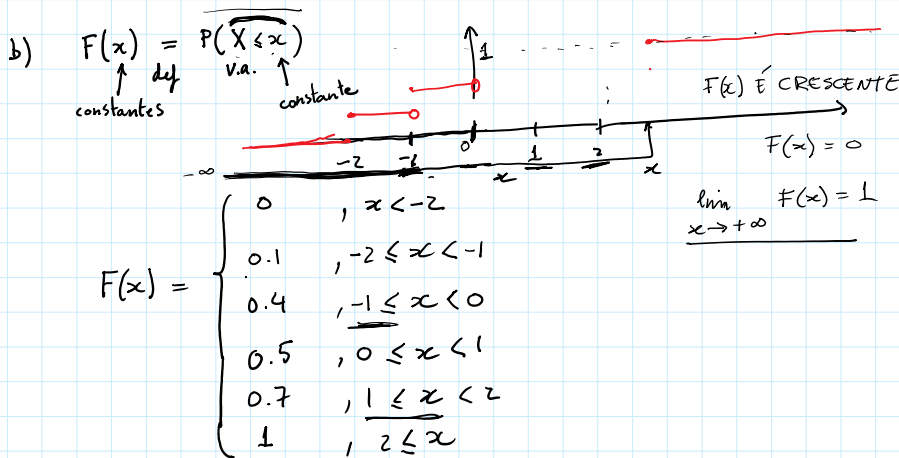
DADO NO ENUNCIADO      PEDI-SE



a) PARA V.A. DISCRETA,  $E[X] = \sum_i (x_i \cdot p_i)$   
 $= -2 \times 0.1 + (-1) \times 0.3 + 0 \times 0.1 + 1 \times 0.2 + 2 \times 0.3 = 0.3$

$\sigma^2 = VAR[X] = E[X^2] - (E[X])^2 = 2.1 - 0.3^2 = 2.01$

C.A.  $E[X^2] = \sum_i (x_i^2 \cdot p_i) = (-2)^2 \times 0.1 + (-1)^2 \times 0.3 + 0^2 \times 0.1 + 1^2 \times 0.2 + 2^2 \times 0.3 = 4 \times 0.1 + 0.3 + 0.2 + 1.2 = 2.1$



c)  $P(X \geq 0 | X < 2) = \frac{P(X \geq 0 \cap X < 2)}{P(X < 2)} = \frac{P(0 \leq X < 2)}{P(X < 2)}$   
 $= \frac{P(X=0) + P(X=1)}{P(X=-2) + P(X=-1) + P(X=0) + P(X=1)} = \frac{0.1 + 0.2}{0.1 + 0.3 + 0.1 + 0.2} = \frac{0.3}{0.7} = \frac{3}{7}$

ALTERNATIVA:

PROP:  $P(a < X \leq b) = F(b) - F(a)$

ENTÃO  $P(0 \leq X < 2) = P(-1 < X \leq 1) = F(1) - F(-1) = 0.7 - 0.4 = 0.3$

porque  $X$  toma valores inteiros

$P(X < 2) = P(X \leq 1) = F(1) = 0.7$

$$d) \underline{Y} = \underline{X^2}$$

$y_i$	$\underline{(-2)^2}$	$\underline{(-1)^2}$	$0^2$	$\underline{1^2}$	$\underline{2^2}$
$x_i$	-2	-1	0	1	2
$P_i$	0.1	0.3	0.1	0.2	0.3

DIST. DE PROB. DA V.A Y :

$$y_i : 0 \quad 1 \quad 4$$

$$P_i = P(Y = y_i) : \begin{array}{l} 0.1 \quad P(X=-1) \\ \quad \quad + P(X=1) \\ \quad \quad = 0.5 \end{array} \quad \begin{array}{l} P(X=2) + \\ P(X=-2) \\ = 0.4 \end{array}$$

$$\sum P_i = 1$$