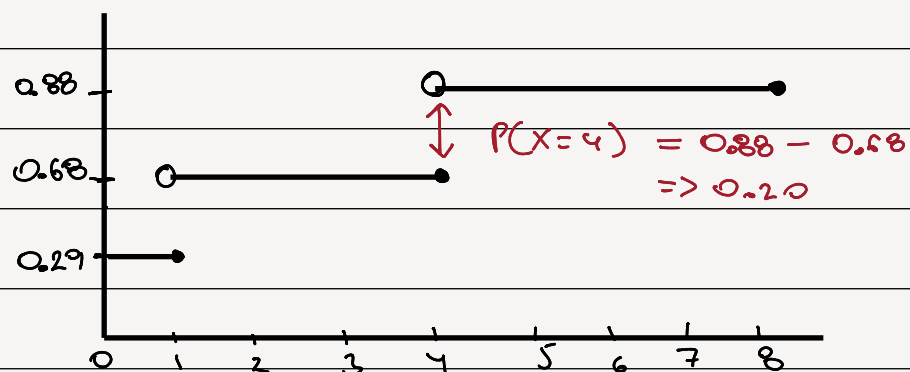The cumulative distribution function of a discrete random variable X is given by

$$F(x) = \begin{cases} 0 & \text{if } x < 0 \\ 0.29 & \text{if } 0 \leq x < 1 \\ 0.68 & \text{if } 1 \leq x < 4 \\ 0.88 & \text{if } 4 \leq x < 8 \\ 1 & \text{if } x \geq 8 \end{cases}$$

$P(X=4) = 0.88 - 0.68$
$\Rightarrow 0.20$

Random variable X is a step function and takes non-zero probabilities only at $\{0, 1, 4, 8\}$

2) Find the range of X.

○ $\{0, 1, 2, 3, 4, 5, 6, 7, 8\}$

○ $[0, 1]$

○ $[0, 8]$

✓ $\{0, 1, 4, 8\}$

3) Calculate $P(X = 4)$.

$P(X = 4) = P(4 \leq n < 8) - P(1 \leq n < 4)$
$\Rightarrow 0.88 - 0.68 = 0.20$

4) Calculate $P(X = 8 | X \geq 4)$. (Write your answer correct to two decimal places)

$P(X = 8 | X \geq 4) = \dfrac{P(X = 8, X \geq 4)}{P(X \geq 4)} = \dfrac{P(X = 8)}{1 - P(X \leq 4)}$

$\Rightarrow \dfrac{P(n \geq 8) - P(4 \leq n < 8)}{1 - P(X \leq 4)}$

$\Rightarrow \dfrac{1 - 0.88}{1 - 0.68}$

$\Rightarrow \dfrac{0.12}{0.32} = 0.375$

5) The cumulative distribution function of a discrete random variable X is given by

$$F(x) = \begin{cases} 0 & \text{if } x < -2 \\ 0.15 & \text{if } -2 \leq x < -1 \\ 0.35 & \text{if } -1 \leq x < 1 \\ 0.75 & \text{if } 1 \leq x < 2 \\ 1 & \text{if } x \geq 2 \end{cases}$$

Let $Y = 2X^2 + 1$. Find the pmf of Y.

$P(X = -2) = 0.15$

$P(X = -1) = 0.35 - 0.15 = 0.2$

$P(X = 1) = 0.75 - 0.35 = 0.4$

$$p(X=2) = 1 - 0.75 = 0.25$$

X	$f_X(x)$	$Y = 2X^2 + 1$
-2	0.15	9
-1	0.2	3
1	0.4	3
2	0.25	9

$\Rightarrow$ PMF of Y will be

○
Y	3	9
$f_Y(y)$	0.6	0.4