1) a?

a) $2a\sum_{x=1}^{3} x + a\sum_{x=4}^{8} x^3 = 1$

$2a(1+2+3) + a(64+125+216+343+512) = 1$

$12a + 1260a = 1$

$a = \frac{1}{1272}$

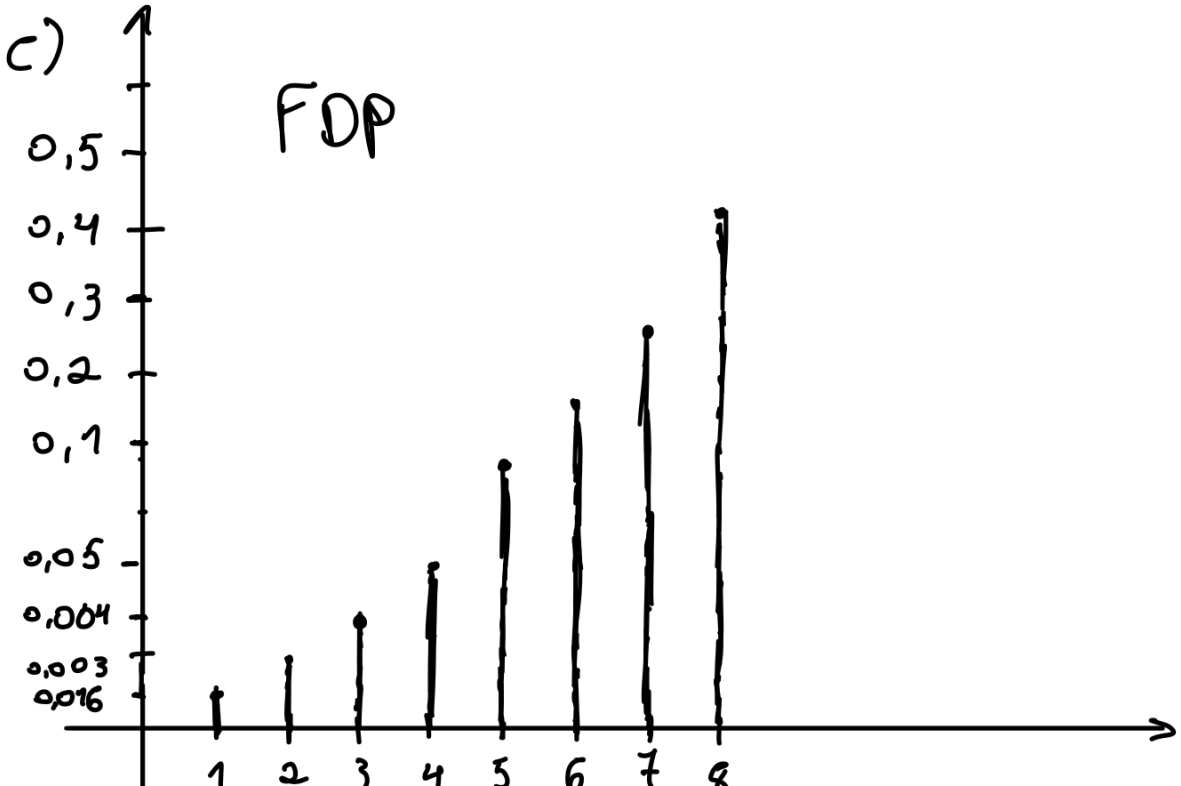
b) $P(2 \leq X \leq 6)$

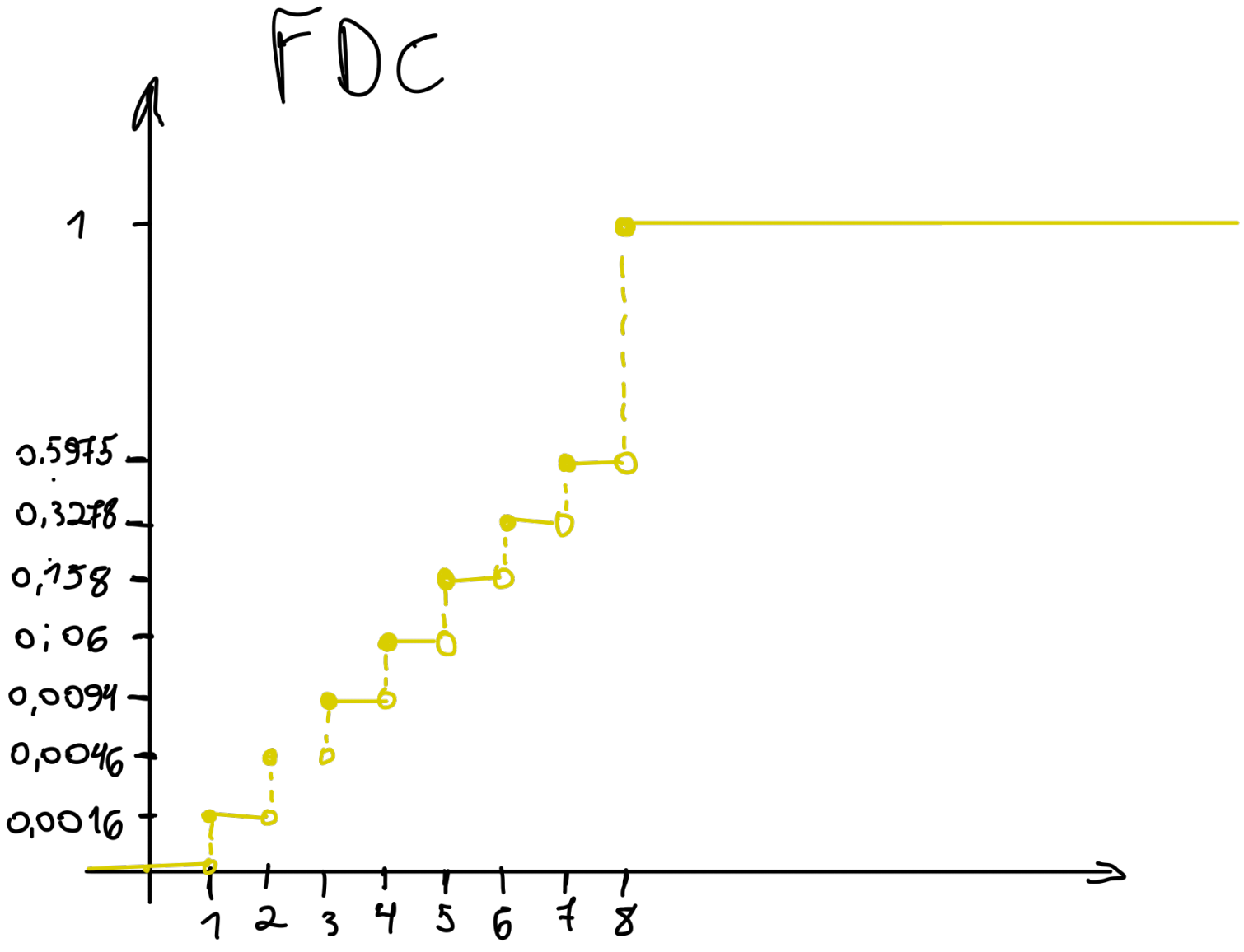
$\frac{2}{1272}\sum_{x=2}^{3} x + \frac{1}{1272}\sum_{x=4}^{6} x^3 =$

$\frac{2(2+3)}{1272} + \frac{(64+125+216)}{1272} =$

$\frac{415}{1272}$

c)





Obs.: Ambos serão aceitos

2) a) $P(x \leq 3) = F_x(3) = 0,95$

b) $P(x \geq 3) = 1 - P(x < 3) = 1 - F_x(2) = 1 - 0,83 = 17\%$

c) $P(x = 1) = F_x(1) - F_x(0) = 0,72 - 0,41 = 0,31$

3) a) c?

$$c\int_0^{20} x(18-x)\,dx = 1 \rightarrow \frac{2800}{3}\cdot c = 1 \therefore c = \frac{3}{2800}$$

b) $P(x=8) = \text{zero}$

c) $P(5 \le x \le 12)$

$$\frac{3}{2800}\int_5^{12} x(18-x)\,dx = \frac{23}{40}$$

d) $F_x(x)$?

$$f_x \xrightarrow{\int dx} F_x(x)$$

$$\frac{3}{2800}\int_0^{x} t\,(18-t)\,dt = \frac{3}{2800}\left[9t^2 - \frac{t^3}{3}\right]\Bigg|_{t=0}^{x}$$

$$F_x(x) = \begin{cases} 0, & x < 0 \\ \frac{3}{2800}\cdot x^2\left(9 - \frac{x}{3}\right), & 0 \le x \le 20 \\ 1, & x > 20 \end{cases}$$