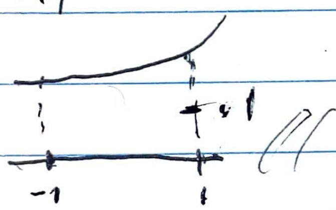
① $f(x) = \begin{cases} cx^2, & \text{se } -1 < x < 1 \\ 0, & \text{caso contrario} \end{cases}$

função densidade $\int_{-\infty}^{\infty} f(x)\, dx = 1$

$$\int_{-1}^{1} cx^2\, dx = c \int_{-1}^{1} x^2 dx = c \int_{-1}^{1} \frac{x^{2+1}}{2+1} = c \left.\frac{x^3}{3}\right]_{-1}^{1}$$

$$= c\left(\frac{1^3}{3} - \frac{(-1)^3}{3}\right) = c\left(\frac{1}{3} - \frac{(-1)}{3}\right) = c\left(\frac{1}{3} + \frac{1}{3}\right) = c\frac{2}{3}$$

$$\int_{-1}^{1} cx^2 dx = c\,\frac{2}{3} \Rightarrow c\,\frac{2}{3} = 1 \Rightarrow 2c = 3 \Rightarrow c = \frac{3}{2} //$$



//

② $f(x) = \begin{cases} 0, & \text{se } x < 0 \\ 2e^{-2x}, & \text{se } x \geq 0 \end{cases}$ para $0 < x < 10$

$$P(0 < x < 10) = \int_0^{10} 2e^{-2x}\, dx \Rightarrow 2\int_0^{10} e^{-2x}\, dx$$

$$\int e^{-2x} dx \Rightarrow u = -2x \quad dx = \frac{du}{-2}$$

$$\int e^u\, du/{-2} \Rightarrow 1/{-2} \int e^u\, du \Rightarrow 1/{-2}\, e^u \Rightarrow -1/2 \cdot e^{-2x}$$

$$2\int_0^{10} e^{-2x} dx \Rightarrow 2.\left(-1/2\ e^{-2x}\right)\Big]_0^{10} = -e^{-2x}\Big]_0^{10} =$$

$$e^{-20} - (-e^0) \Rightarrow \boxed{-e^{-20} + 1} //$$

(3) $f(x) = \begin{cases} 1/2\, e^{-x/2}, & \text{se } x \geq 0 \\ 0, & \text{se } x < 0 \end{cases}$

$6 < x < 18 \Rightarrow 0{,}5 < x < 1{,}5$

meses Anos

$P(0{,}5 < x < 1{,}5) = \int_{0,5}^{1,5} 1/2\, e^{-x/2}\, dx \to 1/2 \int_{0,5}^{1,5} e^{-x/2}\, dx$

$\to 1/2 \cdot \left(-2 e^{-x/2}\right)\Big]_{0,5}^{1,5} = -e^{-x/2}\Big]_{0,5}^{1,5} = e^{-0{,}75} - \left(e^{-0{,}25}\right)$

$\int e^{-x/2}\; du = -1/2 \quad dx = -2 \cdot du$

$\to -1/e^{0{,}75} + 1/e^{0{,}25} = 1/2{,}117 + 1/1{,}284$

$= -0{,}472 + 0{,}779 \to 0{,}307$