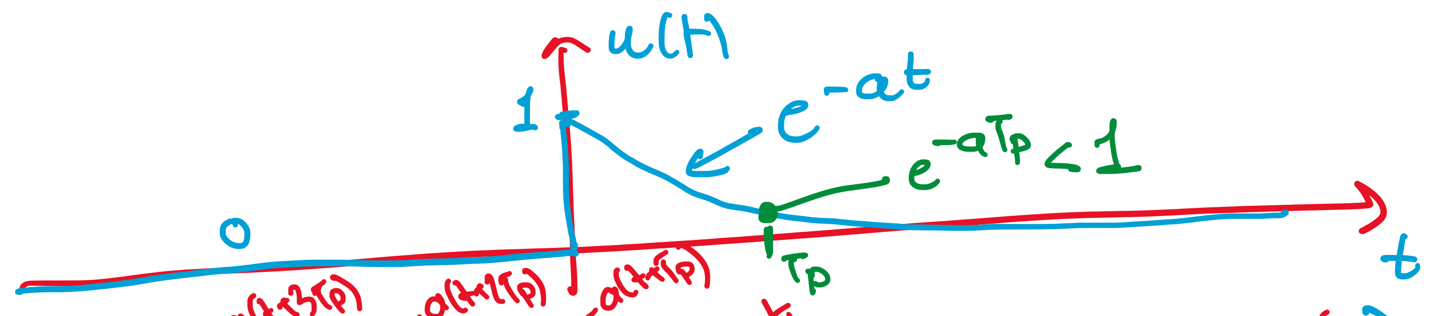
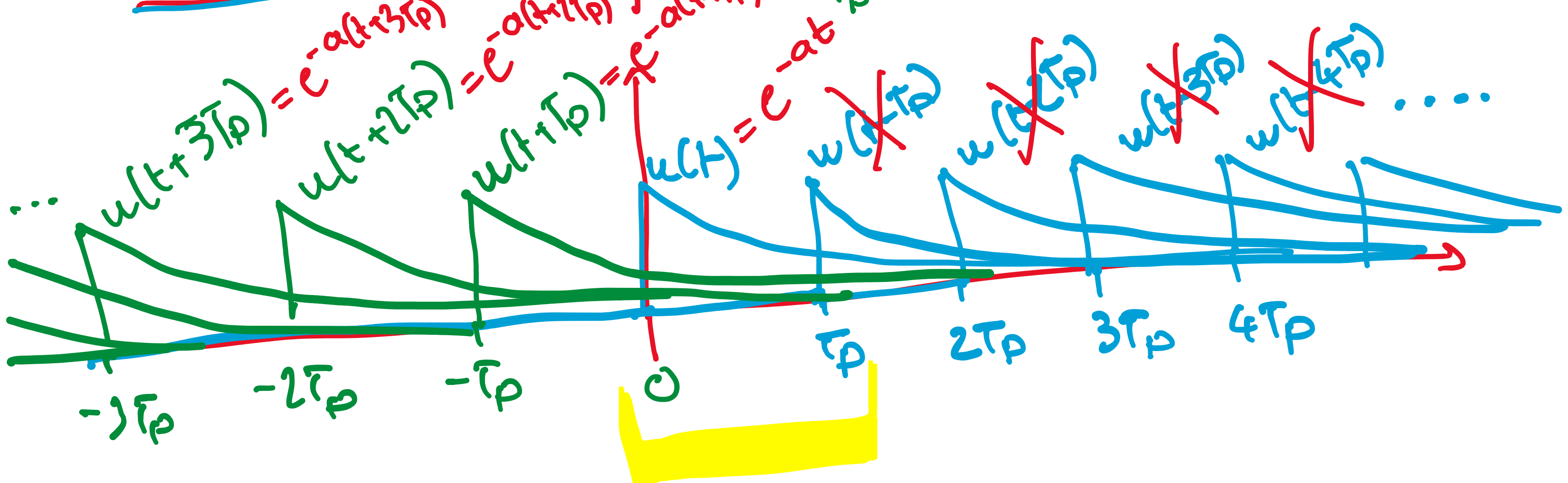
Le5

Wednesday, 6 March 2024 23:41

Es1 TROVARE $s(t) = \text{rep}_{T_p}\, u(t)$ CON

$$u(t) = e^{-at}\,1(t)\,, \quad a>0$$





SCEGLIAMO IL PERIODO

$t \in (0, T_p)$

$$s(t) = \sum_{n=-\infty}^{\cancel{+\infty}\ 0} u(\cancel{t-}nT_p)\; e^{-a(t-nT_p)}$$

$$= e^{-at} \sum_{n=-\infty}^{0} e^{aT_p \cdot n} \longrightarrow m=-n$$

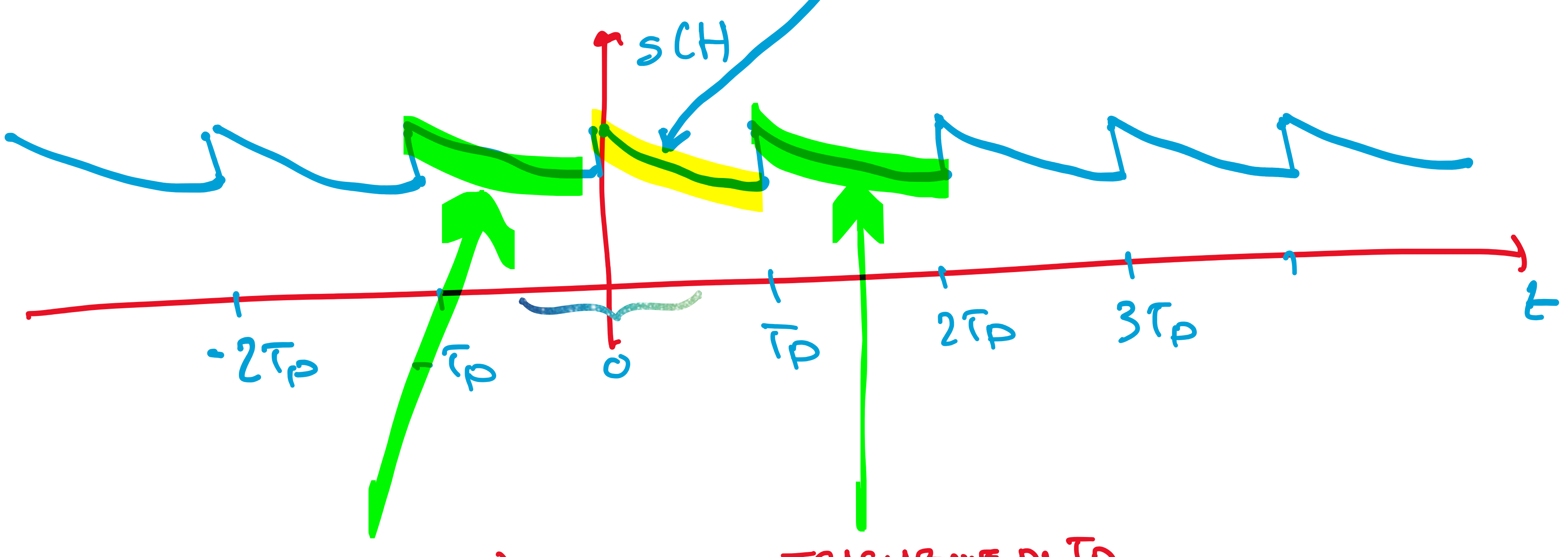
$$= e^{-at} \sum_{m=0}^{+\infty} \left(e^{-aT_p}\right)^m$$

$$= e^{-at} \sum_{m=0}^{+\infty} \alpha^m \qquad \boxed{0<\alpha=e^{-aT_p}<1}$$

$$= \frac{e^{-at}}{1-\alpha} = \frac{e^{-at}}{1-e^{-aT_p}}$$

$$\sum_{m=0} \alpha^m = \frac{1}{1-\alpha} \quad |\alpha|<1$$

SERIE GEOMETRICA



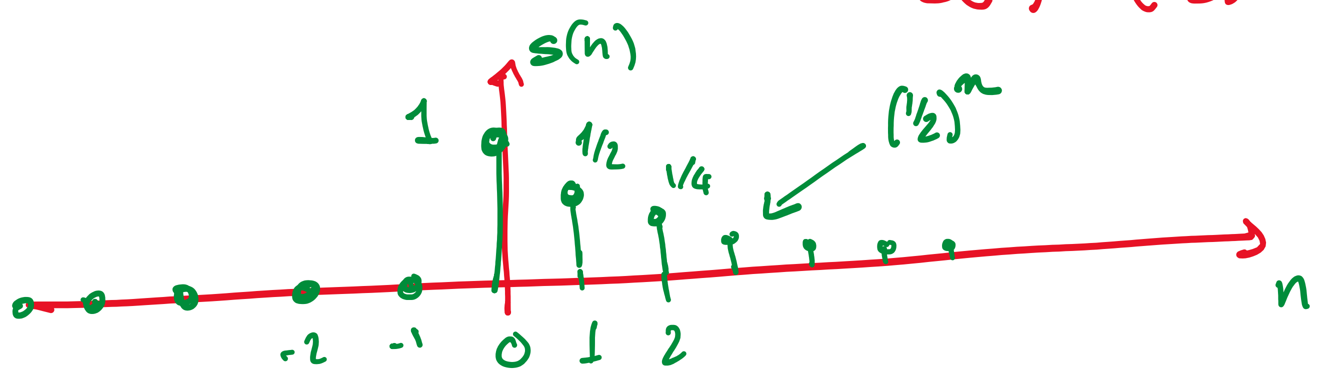
$$\frac{e^{-a(t+T_p)}}{1-e^{-aT_p}}$$

TRASLAZIONE DI T_p

$$\frac{e^{-a(t-T_p)}}{1-e^{-aT_p}}$$

ES CALCOLARE $A_s, m_s, \mathcal{E}_s, P_s$ PER IL SEGNALE

$$s(n) = (1/2)^n\, 1_0(n)$$



$$A_s = \sum_{n=\cancel{-\infty}\ 0}^{+\infty} \cancel{s(n)} \left(\frac{1}{2}\right)^n = \frac{1}{1-\frac{1}{2}} = 2$$

$$m_s = 0$$

$$|s(n)|^2 = \left|(1/2)^n \cdot 1_0(n)\right|^2 = \underbrace{\left|(1/2)^n\right|^2}_{\left(\frac{1}{2}\right)^{n\cdot 2}} \cdot \underbrace{\left|1_0(n)\right|^2}_{1_0(n)}$$

$$= \left[\left(\frac{1}{2}\right)^2\right]^n = \left(\frac{1}{4}\right)^n$$

$$= \left(\frac{1}{4}\right)^n 1_0(n)$$

$$\mathcal{E}_s = \sum_{n=\cancel{-\infty}\ 0}^{+\infty} \cancel{|s(n)|^2} \left(\frac{1}{4}\right)^n = \frac{1}{1-\frac{1}{4}} = \frac{4}{3}$$

$$P_s = 0$$