1 Équations aux différences

EDO vs Equation aux différences

$\frac{dy(t)}{dt} = ay(t) \rightarrow y(t+1) = (a+1)y(t)$

1.0.1 Exemple équation aux différences

$y(k+n) + a_{n-1}y(k+n-1) + ... + a_0 y(k) = 0$

$\lambda^{k+n} + a_{n-1}\lambda^{k+n-1} + ... + a_0\lambda^k = 0$

$\lambda^n + a_{n-1}\lambda^{n-1} + ... + a_0\lambda = 0$

1.0.2 Exemple EDO

$$\frac{dy}{dt} = ay \rightarrow y(t) = Ce^{at}$$

$$y(0) = Ce^{a\cdot 0} = Ce^0 = C$$

$$y(t) = y(0)e^{at}$$

$$\frac{d^2y}{dt^2} + \omega^2 y = 0$$

$$my'' = -ky$$

$$\lambda^2 + \frac{k}{m} = 0 \rightarrow \lambda = \pm j\sqrt{\frac{k}{m}} = \pm j\omega$$

$$y(t) = C_1 e^{j\omega t} + C_2 e^{-j\omega t} = Asin(\omega t) + Bcos(\omega t)$$