

RESPOSTAS DE ALGUNS EXERCÍCIOS DA LISTA 1:

03

$$\begin{bmatrix} \dot{x}_1(t) \\ \dot{x}_2(t) \\ \vdots \\ \dot{x}_m(t) \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 & \dots & 0 \\ 0 & 0 & 1 & \dots & 0 \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ -a_m & -a_{m-1} & -a_{m-2} & \dots & -a_1 \end{bmatrix} \begin{bmatrix} x_1(t) \\ x_2(t) \\ \vdots \\ x_m(t) \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ \vdots \\ 1 \end{bmatrix} u(t)$$

5) a, b, c) $G(s) = \frac{2s}{s+5}$

~~4) NA TABELA~~

6) USAR O MATLAB.

7)

a)

$$\underbrace{\begin{bmatrix} \dot{x}_1(t) \\ \dot{x}_2(t) \end{bmatrix}}_{\dot{x}(t)} = \underbrace{\begin{bmatrix} 0 & 1 \\ -50 & -25 \end{bmatrix}}_A \underbrace{\begin{bmatrix} x_1(t) \\ x_2(t) \end{bmatrix}}_{x(t)} + \underbrace{\begin{bmatrix} 0 \\ -4 \end{bmatrix}}_b \quad \Rightarrow \quad \dot{x}(t) = Ax(t) + b$$

\downarrow
 SISTEMA AFIM.

8)

a) $\frac{d x(t)}{dt} + 10 \ln\left(\frac{1}{2} x(t)\right) = v(t)$

b) $\dot{x}(t) = f(x(t), u(t))$, sendo $f(x(t), u(t)) = -10 \ln\left(\frac{1}{2} x(t)\right) + u(t)$, e
 $y(t) = g(x(t))$
 $g(x(t)) = 10 \ln\left(\frac{1}{2} x(t)\right)$.

0) * CALcular x_e TAL QUE $f(x_e, u_e) = 0$:

$$-10 \ln\left(\frac{1}{2} x_e\right) + u_e = 0 \rightarrow x_e = 2 e^{\frac{1}{10} u_e}$$

$$10 \ln\left(\frac{1}{2} x_e\right) = u_e$$

$$\ln\left(\frac{1}{2} x_e\right) = \frac{1}{10} u_e$$

$$\frac{1}{2} x_e = e^{\frac{1}{10} u_e}$$

$$x_e = 2 e^{0,1 u_e}$$

* POR EXEMPLO:

$$-55 u_e = 0, \text{ ENTÃO, } x_e = 2;$$

$$-55 u_e = 1, \text{ ENTÃO, } x_e = 2,21$$

⋮

1) LIGANDO P/ O PONTO $(x_e, u_e) = (2, 0)$.

$$\Delta x(t) = -5 \Delta x(t) + \Delta u(t)$$

$$\Delta y(t) = 5 \Delta x(t)$$

4)

a) $\dot{x}_1(t) = -\frac{1}{2} x_1(t) + \frac{1}{2} u(t)$

$$y(t) = -\frac{1}{2} x_1(t) + \frac{1}{2} u(t)$$

b)
$$\begin{bmatrix} \dot{x}_1(t) \\ \dot{x}_2(t) \end{bmatrix} = \begin{bmatrix} -1/2 & -1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} x_1(t) \\ x_2(t) \end{bmatrix} + \begin{bmatrix} 1/2 \\ 0 \end{bmatrix} u(t)$$

$$y(t) = \begin{bmatrix} 0 & 1 \end{bmatrix} \begin{bmatrix} x_1(t) \\ x_2(t) \end{bmatrix}$$