

Universidade do Minho

Dep. de Matemática e Aplicações

Mestrado Integrado em Engenharia Informática Introdução aos Sistemas Dinâmicos 2018/19

- edo's lineares de ordem n –

Exercício 1.

(b)
$$y(x) = c_1 e^{2x} + c_2 e^{3x}$$
, $c_1, c_2 \in \mathbb{R}$

(c)
$$y(x) = 3e^{2x} - e^{3x}$$

Exercício 3.

(a)
$$y(x) = c_1 e^{-x} + c_2 e^{3x}$$
, $c_1, c_2 \in \mathbb{R}$

(b)
$$y(x) = c_1 e^{-x} + c_2 e^x + c_3 e^{3x}$$
, $c_1, c_2, c_3 \in \mathbb{R}$

(c)
$$y(x) = c_1 e^{4x} + c_2 x e^{4x}$$
, $c_1, c_2 \in \mathbb{R}$

(d)
$$y(x) = c_1 e^{2x} + c_2 x e^{2x} + c_3 x^2 e^{2x}$$
, $c_1, c_2, c_3 \in \mathbb{R}$

(e)
$$y(x) = c_1 e^{2x} \cos(3x) + c_2 e^{2x} \sin(3x)$$
, $c_1, c_2 \in \mathbb{R}$

(f)
$$y(x) = c_1 e^x + c_2 \cos(x) + c_3 \sin(x)$$
, $c_1, c_2, c_3 \in \mathbb{R}$

(g)
$$y(x) = e^{-\frac{\sqrt{2}}{2}x} \left(c_1 \cos\left(\frac{\sqrt{2}}{2}x\right) + c_2 \sin\left(\frac{\sqrt{2}}{2}x\right) \right) + e^{\frac{\sqrt{2}}{2}x} \left(c_3 \cos\left(\frac{\sqrt{2}}{2}x\right) + c_4 \sin\left(\frac{\sqrt{2}}{2}x\right) \right)$$
, $c_1, c_2, c_3, c_4 \in \mathbb{R}$

(h)
$$y(x) = (c_1 + c_2 x) \operatorname{sen}(x) + (c_3 + c_4 x) \cos(x), \quad c_1, c_2, c_3, c_4 \in \mathbb{R}$$

Exercício 4. $y(x) = c_1 \operatorname{sen}(x) + c_2 \cos(x) + e^{-x}(c_3 \operatorname{sen}(2x) + c_4 \cos(2x)), \quad c_1, c_2, c_3, c_4 \in \mathbb{R}$

Exercício 5.

(a)
$$y(x) = e^{-3x} + 2e^{4x}$$

(b)
$$y(x) = e^{2x} \operatorname{sen}(5x)$$

Exercício 6. $y(x) = \frac{e^x - 2}{e - 2}$

Exercício 7.

(a)
$$y(x) = c_1 e^x + c_2 e^{2x} + 2x^2 + 6x + 7$$
, $c_1, c_2 \in \mathbb{R}$

(b)
$$y(x) = c_1 e^x + c_2 e^{2x} - x e^x + \frac{1}{2}x + \frac{3}{4}$$
, $c_1, c_2 \in \mathbb{R}$

(c)
$$y(x) = c_1 e^x + c_2 e^{2x} - x e^x - \frac{1}{2} x^2 e^x$$
, $c_1, c_2 \in \mathbb{R}$

(d)
$$y(x) = c_1 e^x + c_2 e^{2x} + 2e^{3x} - x^2 e^x - 3xe^x + x^2 + 3x + \frac{7}{2}$$
, $c_1, c_2 \in \mathbb{R}$

Exercício 8.

(a)
$$y(x) = 2e^{-x} + \frac{3}{2}e^{3x} - \frac{1}{2}e^x + 2\operatorname{sen}(x) - \cos(x)$$

(b)
$$y(x) = 6\cos(x) - \sin(x) + 3x^2 - 6 + 2x\cos(x)$$

Exercício 9.

(a)
$$y(x) = c_1 e^x + c_2 e^{2x} + x e^{2x} - \frac{1}{20} \operatorname{sen}(2x) + \frac{3}{20} \cos(2x), \quad c_1, c_2 \in \mathbb{R}$$

(b)
$$y(x) = c_1 e^{-2x} + c_2 e^{2x} + c_3 - \frac{3}{8}x^2 - \frac{1}{3}e^x$$
, $c_1, c_2, c_3 \in \mathbb{R}$

(c)
$$y(x) = c_1 e^{x/2} \operatorname{sen} \left(\frac{\sqrt{7}x}{2} \right) + c_2 e^{x/2} \cos \left(\frac{\sqrt{7}x}{2} \right) + x - \frac{3}{2} e^x$$
, $c_1, c_2 \in \mathbb{R}$

(d)
$$y(x) = c_1 e^{-2x} + c_2 e^x + c_3 e^{3x} - \frac{1}{6} x e^{2x} + \frac{1}{6} x^2 + \frac{5}{18} x + \frac{37}{108}, \quad c_1, c_2, c_3 \in \mathbb{R}$$

(e)
$$y(x) = c_1 e^x + c_2 e^{-x} \operatorname{sen}(x) + c_3 e^{-x} \cos(x) - \frac{4}{25} x e^x + \frac{1}{10} x^2 e^x - \frac{1}{2}, \quad c_1, c_2, c_3 \in \mathbb{R}$$