

Equações Diferenciais de primeira ordem

Respostas:

1. (i) $y(x) = \frac{1}{2}(x+1)^4 + C(x+1)^2, \quad C \in \mathbb{R}.$

(ii) $y(x) = e^{-x}(x+C), \quad C \in \mathbb{R}.$

(iii) $y(x) = x^n(e^x + C), \quad C \in \mathbb{R}.$

(iv) $y(x) = \frac{1}{2} + Ce^{-2e^x}, \quad C \in \mathbb{R}.$

(v) $s(t) = \text{sen } t + C \text{ cos } t, \quad C \in \mathbb{R}.$

2. (i) $y(x) = \frac{e^{3x}}{4} + x^3 - 3x^2 + 6x - 6 + \frac{27}{4}e^{-x}$

(ii) $y(x) = e^{-\text{sen } x}(x^2 - \pi^2)$

(iii) $y(x) = \frac{\sqrt{2}}{3} \frac{x(x+1)^{1/2}}{(x-1)^{3/2}} + \frac{2}{3}x(x+1)^{1/2}$

(iv) $y(x) = x^2$ se $x \geq 0$ e $y(x) = x^2(1 + Ce^{1/x})$ se $x < 0, \quad C \in \mathbb{R}.$

3. (i) $y(x) = \ln(e^x + C), \quad C \in \mathbb{R}.$

(ii) $y(x) = (2k-1)\pi/2, \quad k \in \mathbb{Z}$ e $\text{tg } y + \cos x = C, \quad C \in \mathbb{R}.$

(iii) $y(x) = \pm 1$ e $y(x) = \text{sen}(x+C), \quad C \in \mathbb{R}.$

(iv) $y(x) = 1$ e $y(x) = \frac{Ce^x - 1}{Ce^x + 1}, \quad C \in \mathbb{R}.$

(v) $\frac{\cos \theta}{\cos \phi} = C, \quad C \in \mathbb{R}, \quad C \neq 0.$

(vi) $(\ln y)^2 = \ln(x^2) + C, \quad C \in \mathbb{R}.$

Equações diferenciais de segunda ordem

Respostas:

1. (i) $y(x) = A \cos(2x) + B \text{ sen}(2x), \quad A, B \in \mathbb{R}.$

(ii) $y(x) = e^{-x}(A + Bx), \quad A, B \in \mathbb{R}.$

(iii) $y(x) = A e^{(-\frac{1-\sqrt{5}}{2})x} + B e^{(-\frac{1+\sqrt{5}}{2})x}, \quad A, B \in \mathbb{R}.$

(iv) $y(x) = A e^{(\frac{9-3\sqrt{5}}{2})x} + B e^{(\frac{9+3\sqrt{5}}{2})x}, \quad A, B \in \mathbb{R}.$

$$(v) y(x) = e^{-x}[A \cos(\sqrt{3}x) + B \operatorname{sen}(\sqrt{3}x)], \quad A, B \in \mathbb{R}.$$

$$\mathbf{3} \text{ (i)} \quad y_p(x) = -\frac{1}{3}x^2 - \frac{20}{9}x - \frac{107}{27}$$

$$\text{(ii)} \quad y_p(x) = \frac{1 + \operatorname{sen}(2x)}{8}$$

$$\text{(iii)} \quad y_p(x) = e^x(x^2 - 6x + 16) + \frac{1}{109}[-10 \cos(3x) + 3 \operatorname{sen}(3x)]$$

$$\text{(iv)} \quad y_p(x) = \frac{1}{4}e^x + \frac{1}{2}x^2e^{-x}$$

$$\text{(v)} \quad y_p(x) = -\frac{x}{2} \cos x$$

$$\mathbf{4.} \text{ (i)} \quad y(x) = xe^x$$

$$\text{(ii)} \quad y(x) = e^x(1 + x - \cos x)$$

$$\text{(iii)} \quad y(x) = 2e^{\frac{3}{2}x} \cos\left(\frac{\sqrt{3}x}{2}\right) + x^2 + 2x + 2$$