Introdução às Equações Diferenciais Ordinárias

Lista de Exercícios 1 - Respostas

3. (a) $r = -2$; (b) $r = \pm 1$; (c) $r = 2$ e $r = -3$; (d) $r = 0, r = 1$ e $r = 2$.

5. (a) $y(x) = \sqrt{-x^2 + 2c}$, $y(x) = -\sqrt{-x^2 + 2c}$;

   (b) $y(x) = c_2 x$;

   (c) $y(x) = -\sqrt{2 + 2cosx}$;

   (d) $y(x) = x^2/2 + c$;

   (e) $(y^3/3) + (y^2/2) = -(x^3/3) - x + c$;

   (f) $(y^6/6) - y = (1/2)(1 - e^{x^2})$;

   (g) $y(x) = -x(\ln x - c)$;

   (h) $1/3(\ln(-\frac{y^2}{x^2} + 3) + \ln(\frac{y}{x})) = -\ln x + c$;

   (i) $y = -x\sqrt{-\frac{2c_1+2\ln x+1}{2c_1+2\ln x}}$, $y = x\sqrt{-\frac{2c_1+2\ln x+1}{2c_1+2\ln x}}$;

   (j) $y = -\sqrt{\frac{cx^{-1}-x^2}{3}}$, $y = \sqrt{\frac{cx^{-1}-x^2}{3}}$;

6. (a) $y = e^{-2t} + (t/3) + ce^{-3t} - (1/9)$;

   (b) $y = (t^3/3 + c)e^{2t}$;

   (c) $y = \frac{3\,\mathrm{sen}\,2t}{2} + \frac{3\cos 2t}{4t} + \frac{c}{t}$;

   (d) $y = e^{-t}(t^2/2 + c) + 1$;

   (e) $y = ce^{2t} - 3e^t$;

   (f) $y = (1/t^2)(\mathrm{sen}\,t - t\cos t + c)$;

   (g) $y = (t^2 + c)e^{-t^2}$;

   (h) $y = 3(t - 2) + ce^{-t/2}$;

   (i) $y = ct - te^{-t}$;

   (j) $y = ce^{-t} + \mathrm{sen}\,(2t) - 2\cos(2t)$;

   (k) $y = ce^{-t/2} + 3(t^2 - 4t + 8)$;

7. (a) $y = 2e^{2t}(t - 1) + 3e^t$;

   (b) $y = \frac{t^2}{4} - \frac{t}{3} + \frac{1}{2} + \frac{t^{-2}}{12}$;

   (c) $y = e^{-2t}(t^2 - 1)/2$;

(d) $y = \operatorname{sen} t/t^2$;

(e) $y = (t+2)e^{2t}$;

(f) $y = \frac{\operatorname{sen} t + (\pi^2/4) - 1}{t^2} - \frac{\cos t}{t}$;

(g) $y = \frac{-e^{-t}(1+t)}{t^4} \quad t \neq 0$;

8. (a) $y = t^{-2}(c - t\cos t + \operatorname{sen} t)$, $y(t) \to 0$ quando $t \to \infty$;

   (b) $y = ce^{-t/2} + 3(t-2)$; y é assintótico a $3(t-2)$ quando $t \to \infty$. Assim, $y(t) \to \infty$ quando $t \to \infty$.

9. $y_0 = -5/2$;

11. (e) $y = \pm(5t/(2 + 5ct^5))^{1/2}$;

    (f) $y = r/(k + cre^{-rt})$;

12. (c.1) $y = t + \frac{e^{-t^4/4}}{\int t^2 e^{-t^4/4} dt + c}$;

    (c.2) $y = 1 + \frac{1}{1 - t + ce^{-t}}$;

    (c.3) $y = e^t + \frac{1}{1 + ce^{-t}}$;