Universidade Federal Fluminense
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LISTA 12 - 2010-2
EDO linear de ordem n
com coeficientes constantes:
Método dos coeficientes indeterminados
Método de variação dos parâmetros

Nos exercícios 1 a 12 encontre a solução geral da EDO linear homogênea.

1. $y'' - 36y = 0$
2. $y'' + 9y = 0$
3. $y'' - y' - 6y = 0$
4. $\dfrac{d^2y}{dx^2} + 8\dfrac{dy}{dx} + 16y = 0$
5. $y'' + 3y' - 5y = 0$
6. $y'' - 4y' + 5y = 0$
7. $3y'' + 2y' + y = 0$
8. $y''' - y = 0$
9. $y''' - 5y'' + 3y' + 9y = 0$
10. $y'' + y'' - 2y = 0$
11. $16y^{iv} + 24y'' + 9y = 0$
12. $y^{(5)} - 16y' = 0$

Nos exercícios 13 e 14 resolva o PVI.

13. $y''' + 12y'' + 36y' = 0; \quad y(0) = 0; \quad y'(0) = 1; \quad y''(0) = -7$
14. $y^{(4)} - 3y^{(3)} + 3y'' - y' = 0; \quad y(0) = y'(0) = 0; \quad y''(0) = y'''(0) = 1$

Nos exercícios 15 a 21 resolva as equações, usando o método dos coeficentes indeterminados.

15. $y'' - y' + \dfrac{1}{4}\,y = 3 + e^{x/2}$
16. $y'' + y = 2x \operatorname{sen} x$
17. $y'' + 4y = (x^2 - 3)\operatorname{sen} 2x$
18. $y'' + 2y' + y = \operatorname{sen} x + 3\cos 2x$
19. $y''' - 3y'' + 3y' - y = x - 4e^x$
20. $y''' - y'' + y' - y = xe^x - e^{-x} + 7$
21. $16y^{(4)} - y = e^{x/2}$

Nos exercícios 22 a 24 resolva as equações.

22. $y'' - y = 1/x, \quad x > 0$
23. $4y'' + 36y = \csc 3x\ , \quad x \in (0, \pi/6)$
24. $y''' - y'' + y' - y = e^{-x}\operatorname{sen} x$

Nos exercícios 25 e 26 resolva o PVI.

25. $y^{iv} + 2y'' + y = \operatorname{sen} x, \quad y(0) = 2; \quad y'(0) = 0; \quad y''(0) = -1; \quad y'''(0) = 1$
26. $y''' - y'' + y' - y = \sec x; \quad y(0) = 2; \quad y'(0) = -1; \quad y''(0) = 1$

RESPOSTAS DA LISTA 12 (Com indicação ou resumo de algumas resoluções)

1. $y(x) = C_1 e^{6x} + C_2 e^{-6x}$
2. $y(x) = C_1 \cos 3x + C_2 \operatorname{sen} 3x$
3. $y(x) = C_1 e^{3x} + C_2 e^{-2x}$
4. $y(x) = C_1 e^{-4x} + C_2\, x e^{-4x}$
5. $y(x) = C_1 e^{\frac{-3-\sqrt{29}}{2}x} + C_2 e^{\frac{-3+\sqrt{29}}{2}x}$
6. $y(x) = C_1 e^{2x}\cos x + C_2 e^{2x}\operatorname{sen} x$
7. $y(x) = C_1 e^{\frac{-x}{3}}\cos\frac{\sqrt{2}\,x}{3} + C_2 e^{\frac{-x}{3}}\operatorname{sen}\frac{\sqrt{2}\,x}{3}$
8. $y(x) = C_1 e^{x} + C_2 e^{\frac{-x}{2}}\cos\frac{\sqrt{3}\,x}{2} + C_3 e^{\frac{-x}{2}}\operatorname{sen}\frac{\sqrt{3}\,x}{2}$
9. $y(x) = C_1 e^{-x} + C_2 e^{3x} + C_3\, x e^{3x}$
10. $y(x) = C_1 e^{x} + e^{-x}\,(C_2\cos x + C_3 \operatorname{sen} x)$
11. $y(x) = C_1\cos\left(\frac{\sqrt{3}x}{2}\right) + C_2\operatorname{sen}\left(\frac{\sqrt{3}x}{2}\right) + C_3\, x\cos\left(\frac{\sqrt{3}x}{2}\right) + C_4\, x\operatorname{sen}\left(\frac{\sqrt{3}x}{2}\right)$
12. $y(x) = C_1 + C_2 e^{2x} + C_3 e^{-2x} + C_4\cos 2x + C_5 \operatorname{sen} 2x$
13. $y(x) = \frac{5}{36} - \frac{5}{36}e^{-6x} + \frac{x}{6}e^{-6x}$
14. $y(x) = \frac{2}{3} - \frac{2}{3}e^{x} + \frac{2}{3}\,xe^{x} - \frac{1}{6}\,x^2 e^{x}$
15. $y(x) = C_1 e^{x/2} + C_2\, x e^{x/2} + 12 + \dfrac{x^2 e^{x/2}}{2}$
16. $y(x) = C_1\cos x + C_2\operatorname{sen} x - \dfrac{x^2\cos x}{2} + \dfrac{x\operatorname{sen} x}{2}$
17. $y(x) = C_1\cos 2x + C_2\operatorname{sen} 2x + \frac{25}{32}x\cos 2x + \frac{1}{16}x^2\operatorname{sen} 2x - \frac{1}{12}x^3\cos 2x$
18. $y(x) = C_1 e^{-x} + C_2\, x e^{-x} - \dfrac{\cos x}{2} + \dfrac{12\operatorname{sen} 2x}{25} - \dfrac{9\cos 2x}{25}$
19. $y(x) = C_1 e^{x} + C_2\, x e^{x} + C_3\, x^2 e^{x} - x - 3 - \frac{2}{3}x^3 e^{x}$
20. $y(x) = C_1 + C_2\cos x + C_3\operatorname{sen} x - 7 + \frac{1}{4}\,e^{-x} - \frac{1}{2}\,xe^{x} + \frac{1}{4}x^2 e^{x}$
21. $y(x) = C_1 e^{x/2} + C_2 e^{-x/2} + C_3\cos(x/2) + C_4\,(\operatorname{sen} x/2) + \frac{1}{8}\,e^{x/2}$
22. $y = C_1 e^{x} + C^2 e^{-x} + \frac{1}{2}e^{x}\displaystyle\int_{x_0}^{x}\frac{e^{-t}}{t}\,dt - \frac{1}{2}e^{-x}\int_{x_0}^{x}\frac{e^{t}}{t}\,dt$
23. $y = C_1\cos 3x + C_2\operatorname{sen} 3x - \dfrac{x\cos 3x}{12} + \dfrac{\operatorname{sen} 3x}{36}\ln|\operatorname{sen} 3x|, \quad x \in (0, \pi/6)$
24. $y = C_1 e^{x} + C_2\cos x + C_3\operatorname{sen} x - \frac{1}{2}x^2\operatorname{sen} x$
25. $y = 2\cos x + \frac{7}{8}\,\operatorname{sen} x - \frac{7}{8}\,x\cos x + \frac{1}{2}\,x\operatorname{sen} x - \frac{1}{8}x^2\operatorname{sen} x$
26. $y = \frac{3}{2} + \frac{1}{2}\cos x - \frac{5}{2}\,\operatorname{sen} x - \frac{1}{2}(\cos x)\ln(\cos x) + -\frac{1}{2}(\operatorname{sen} x)\ln(\cos x) - \frac{1}{2}x\cos x -$
$-\frac{1}{2}\operatorname{sen} x + \frac{1}{2}e^{x}\displaystyle\int_{0}^{x}\frac{e^{-x}}{\cos x}\,dx$