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EGM - Instituto de Matemática
GMA - Departamento de Matemática Aplicada

LISTA 12 - 2015-2

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

Nos exercícios 13 e 14 resolva o PVI.

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

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

15. $y'' - y' + \frac{1}{4}y = 3 + e^{x/2}$
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. $y'' - y = 1/x$, $x > 0$
23. $4y'' + 36y = \operatorname{csc} 3x$, $x \in (0, \pi/6)$
24. $y''' - y'' + y' - y = e^{-x} \operatorname{sen} x$

Nos exercícios 25 e 26 resolva o PVI.

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

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

1. $y(x) = C_1 e^{6x} + C_2 e^{-6x}$
2. $y(x) = C_1 \cos 3x + C_2 \sin 3x$
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. $y(x) = C_1 e^{2x} \cos x + C_2 e^{2x} \sin x$
7. $y(x) = C_1 e^{\frac{-x}{3}} \cos \frac{\sqrt{2}x}{3} + C_2 e^{\frac{-x}{3}} \sin \frac{\sqrt{2}x}{3}$
8. $y(x) = C_1 e^x + C_2 e^{\frac{-x}{2}} \cos \frac{\sqrt{3}x}{2} + C_3 e^{\frac{-x}{2}} \sin \frac{\sqrt{3}x}{2}$
9. $y(x) = C_1 e^{-x} + C_2 e^{3x} + C_3 x e^{3x}$
10. $y(x) = C_1 e^x + e^{-x} (C_2 \cos x + C_3 \sin x)$
11. $y(x) = C_1 \cos \left(\frac{\sqrt{3}x}{2} \right) + C_2 \sin \left(\frac{\sqrt{3}x}{2} \right) + C_3 x \cos \left(\frac{\sqrt{3}x}{2} \right) + C_4 x \sin \left(\frac{\sqrt{3}x}{2} \right)$
12. $y(x) = C_1 + C_2 e^{2x} + C_3 e^{-2x} + C_4 \cos 2x + C_5 \sin 2x$
13. $y(x) = \frac{5}{36} - \frac{5}{36} e^{-6x} + \frac{x}{6} e^{-6x}$
14. $y(x) = \frac{2}{3} - \frac{2}{3} e^x + \frac{2}{3} x e^x - \frac{1}{6} x^2 e^x$
15. $y(x) = C_1 e^{x/2} + C_2 x e^{x/2} + 12 + \frac{x^2 e^{x/2}}{2}$
16. $y(x) = C_1 \cos x + C_2 \sin x - \frac{x^2 \cos x}{2} + \frac{x \sin x}{2}$
17. $y(x) = C_1 \cos 2x + C_2 \sin 2x + \frac{25}{32} x \cos 2x + \frac{1}{16} x^2 \sin 2x - \frac{1}{12} x^3 \cos 2x$
18. $y(x) = C_1 e^{-x} + C_2 x e^{-x} - \frac{\cos x}{2} + \frac{12 \sin 2x}{25} - \frac{9 \cos 2x}{25}$
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. $y(x) = C_1 + C_2 \cos x + C_3 \sin x - 7 + \frac{1}{4} e^{-x} - \frac{1}{2} x e^x + \frac{1}{4} x^2 e^x$
21. $y(x) = C_1 e^{x/2} + C_2 e^{-x/2} + C_3 \cos(x/2) + C_4 (\sin x/2) + \frac{1}{8} e^{x/2}$
22. $y = C_1 e^x + C_2 e^{-x} + \frac{1}{2} e^x \int_{x_0}^x \frac{e^{-t}}{t} dt - \frac{1}{2} e^{-x} \int_{x_0}^x \frac{e^t}{t} dt$
23. $y = C_1 \cos 3x + C_2 \sin 3x - \frac{x \cos 3x}{12} + \frac{\sin 3x}{36} \ln |\sin 3x|, \quad x \in (0, \pi/6)$
24. $y = C_1 e^x + C_2 \cos x + C_3 \sin x - \frac{1}{2} x^2 \sin x$
25. $y = 2 \cos x + \frac{7}{8} \sin x - \frac{7}{8} x \cos x + \frac{1}{2} x \sin x - \frac{1}{8} x^2 \sin x$
26. $y = \frac{3}{2} + \frac{1}{2} \cos x - \frac{5}{2} \sin x - \frac{1}{2} (\cos x) \ln(\cos x) + -\frac{1}{2} (\sin x) \ln(\cos x) - \frac{1}{2} x \cos x -$
 $-\frac{1}{2} \sin x + \frac{1}{2} e^x \int_0^x \frac{e^{-x}}{\cos x} dx$