Equazioni differenziali lineari a coefficienti costanti

Determinare l'integrale generale delle seguenti equazioni differenziali lineari:

1. $y'' + 5y' + 4y = 3 - 2x\,;$
2. $y'' - 2y' + y = 6xe^x;$
3. $y'' - 5y' + 6y = e^{2x};$
4. $y'' - 4y = e^x;$
5. $y'' - 2y' + 2y = 4x + 3\,;$
6. $y'' + y = e^x(x^2 - 1)\,;$
7. $y'' - 4y' + 4y = 2e^{2x} + \dfrac{x}{2}\,;$
8. $3y'' + 8y' + 4y = e^{-x} + \sin x\,;$
9. $y'' + 4y = \sin(2x)\,;$
10. $y'' + y = xe^x \sin(2x)\,;$
11. $y'' - 4y' + 4y = 7e^{7x} + x^2 - 7x\,;$
12. $y'' + 9y = 9\cos(3x) + 16 + x\,;$
13. $y'' - 8y' + 16y = 4e^{28x} + 7x^2 - 4x\,;$
14. $3y'' + 10y' + 3y = x\,;$
15. $y'' + 9y = \sin(3x) + 5x\,.$

Risultati

1. $y(x) = c_1 e^{-4x} + c_2 e^{-x} + \left(-\dfrac{1}{2}\,x + \dfrac{11}{8}\right), \qquad c_1, c_2 \in \mathbb{R}\,;$
2. $y(x) = e^x(c_1 + c_2 x + x^3), \qquad c_1, c_2 \in \mathbb{R}\,;$
3. $y(x) = c_1 e^{2x} + c_2 e^{3x} - xe^{2x}, \qquad c_1, c_2 \in \mathbb{R}\,;$
4. $y(x) = c_1 e^{-2x} + c_2 e^{2x} - \dfrac{1}{3}\,e^x, \qquad c_1, c_2 \in \mathbb{R}\,;$

5. $y(x) = e^x(c_1 \sin x + c_2 \cos x) + 2x + \frac{7}{2}\,, \qquad c_1, c_2 \in \mathbb{R}\,;$

6. $y(x) = c_1 \sin x + c_2 \cos x + \left(\frac{1}{2}\,x^2 - x\right)e^x, \qquad c_1, c_2 \in \mathbb{R}\,;$

7. $y(x) = c_1 e^{2x} + c_2 x e^{2x} + x^2 e^{2x} + \frac{x+1}{8}, \qquad c_1, c_2 \in \mathbb{R}\,;$

8. $y(x) = c_1 e^{-2x} + c_2 e^{-\frac{2}{3}x} - e^{-x} + \frac{1}{65}\,\sin x - \frac{8}{65}\,\cos x, \quad c_1, c_2 \in \mathbb{R}\,;$

9. $y(x) = c_1 \sin(2x) + c_2 \cos(2x) - \frac{1}{4}\,x \cos(2x), \qquad c_1, c_2 \in \mathbb{R}\,;$

10. $$y(x) = c_1 \sin x + c_2 \cos x + \frac{e^x}{50}\Big((2 - 10x)\cos(2x) + \\ + (11 - 5x)\sin(2x)\Big), \qquad c_1, c_2 \in \mathbb{R}\,.$$