Ecuatii diferentiale de ordin superior liniare cu coeficienti constanti

1. Determinati solutia generala pentru urmatoarele ecuatii diferentiale liniare omogene:

    1. $y^{(3)} + 4y^{(2)} + 3y^{(1)} = 0$
    2. $8y^{(3)} + 12y^{(2)} + 6y^{(1)} + y = 0$
    3. $y^{(5)} - y^{(4)} - 8y^{(3)} + 8y^{(2)} + 16y^{(1)} - 16y = 0$
    4. $y^{(2)} + 4y^{(1)} + 5y = 0$
    5. $y^{(3)} + y = 0$
    6. $y^{(4)} + 4y^{(2)} = 0$
    7. $y^{(5)} - y^{(4)} + 8y^{(3)} - 8y^{(2)} + 16y^{(1)} - 16y = 0$
    8. $y^{(4)} - 2y^{(3)} + 3y^{(2)} - 2y^{(1)} + y = 0.$

2. Determinati solutia generala pentru urmatoarele ecuatii diferentiale liniare neomogene:

    1. $y^{(3)} + 2y^{(2)} = x + 2$
    2. $y^{(4)} - 4y^{(2)} + 4y = x^2 + x + 1$
    3. $y^{(2)} - y = xe^{2x}$
    4. $y^{(2)} - 4y = xe^{2x}$
    5. $y^{(2)} + 4y = (x - 1)\sin x$
    6. $y^{(2)} - y = xe^{x}\cos x$
    7. $y^{(2)} - 4y = e^{2x} - xe^{-x} + e^{x}\cos 2x$
    8. $y^{(2)} - 2y^{(1)} + y = e^{x} + \cos 2x - 2\sin x + 1$
    9. $y^{(2)} - 5y^{(1)} + 6y = (20x^2 + 1)\, e^{-2x} + xe^{2x}$
    10. $y^{(4)} - 3y^{(2)} - 4y = x^2 + 1 + e^{3x} + 4\cos x.$

3. Rezolvati urmatoarele probleme Cauchy:

1. $y^{(2)} - 5y^{(1)} + 4y = 0, \begin{cases} y(0) & = 5 \\ y^{(1)}(0) & = 8 \end{cases}$

2. $y^{(3)} + y^{(1)} = 0, \begin{cases} y(\frac{\pi}{2}) & = & 0 \\ y^{(1)}(\frac{\pi}{2}) & = & 1 \\ y^{(2)}(\frac{\pi}{2}) & = & 1 \end{cases}$

3. $y^{(2)} - 2y^{(1)} - 3y = x\left(e^{x} + e^{3x}\right), \begin{cases} y(0) & = & 4 \\ y^{(1)}(0) & = & -\frac{5}{16} \end{cases}$

4. $y^{(3)} - y^{(1)} = -2x, \begin{cases} y(0) & = & 0 \\ y^{(1)}(0) & = & 2 \\ y^{(2)}(0) & = & 2 \end{cases}.$