

2. Use Undetermined Coefficients to find a particular solution (only) of the DE $y''' + 3y'' - y' - 3y = e^{-2x}(2 - 17x + 3x^2)$

$$y_p' = u'e^{-2x} - 2ue^{-2x}$$

. Note that if $y_p = ue^{-2x}$, then $y_p'' = u''e^{-2x} - 4u'e^{-2x} + 4ue^{-2x}$.

$$y_p''' = u'''e^{-2x} - 6u''e^{-2x} + 12u'e^{-2x} - 8ue^{-2x}$$

3. Consider the system of differential equation

$$\begin{aligned}y_1' &= -7y_1 + 4y_2 \\y_2' &= -6y_1 + 7y_2\end{aligned}$$

a. Write the system in matrix form, using \vec{y} as the vector of functions

b. Use the method of **substitution/elimination** to find the two individual solution functions y_1 and y_2

c. Write the general solution

d. Find the particular solution corresponding to $\vec{y}(0) = \begin{bmatrix} -1 \\ 7 \end{bmatrix}$

4. Consider system of equations given by the matrix equation $\vec{y}' = \begin{bmatrix} 5 & 1 & 3 \\ 1 & 7 & 1 \\ 3 & 1 & 5 \end{bmatrix} \vec{y}$

a. Find the eigenvalues of A

b. For each eigenvalue λ , find an eigenvector \mathbf{v} that goes with it

c. Use your answer from part b to find a general solution, in the form $c_1 e^{\lambda_1 x} \vec{v}_1 + \dots$

5. Suppose you are given two solutions $y_1(x), y_2(x)$ of a system of equations.

a. How is the Wronskian computed?

b. What does it tell us?