

Assignment - 2
Mathematical Methods

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1. Use method of variation of parameter to find general solution to the following differential equation

(i) $2y'' + 18y = 6 \tan(3t)$

(ii) $y'' - 2y' + y = \frac{e^t}{t^2 + 1}$

2. Find the general solution to

$$ty'' - (t+1)y' + y = t^2$$

given that $y_1(t) = e^t$, $y_2(t) = t+1$
form a fundamental set of solutions for the homogeneous differential equation.

3. Consider the 3rd order ODE

$$y''' + a(x)y'' + b(x)y' + c(x)y = r(x)$$

Extend the concept of method of variation of parameter for a 2nd order ODE to find a particular integral for this 3rd order ODE case. Hence show that if

$$y_p(x) = u(x)y_1(x) + v(x)y_2(x) + w(x)y_3(x)$$

where y_1, y_2 and y_3 are 3 L.C. solⁿ. of the homogeneous

ODE, then $u = \int \frac{W_1}{W(y_1, y_2, y_3)} dx$, $v = \int \frac{W_2}{W(y_1, y_2, y_3)} dx$, $w = \int \frac{W_3}{W(y_1, y_2, y_3)} dx$

where W_i is the determinant obtained from $W(y_1, y_2, y_3)$

by replacing the i th column by the column vector $[0, 0, r(x)]^T$.

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