

NAME:

Home Work 11.

MAP 2302 - Differential Equations

Solve the following ODE using the VARIATION OF PARAMETERS:

1. $y'' + y = \tan x$. Ans: $y = y_c + y_p = c_1 \cos x + c_2 \sin x - \cos x \ln |\sec x + \tan x|$.
2. $(x^2 + 1)y'' - 2xy' + 2y = 6(x^2 + 1)^2$; $y_1(x) = x$, $y_2(x) = x^2 - 1$.
Ans: $y = y_c + y_p = c_1x + c_2(x^2 - 1) + (3x^2 + x^4)$.
3. $y'' + y = \tan x \sec x$.
Ans: $y = y_c + y_p = c_1 \cos x + c_2 \sin x + x \cos x - \sin x \ln |\cos x| - \sin x$.
4. $y'' + 6y' + 9y = \frac{e^{-3x}}{x^3}$. Ans: $y = y_c + y_p = c_1e^{-3x} + c_2xe^{-3x} + \frac{1}{2}x^{-1}e^{-3x}$.
5. $y'' - 2y' + y = xe^x \ln x$ ($x > 0$).
Ans: $y = y_c + y_p = c_1e^x + c_2xe^x + \left\{\frac{1}{6}x^3 \ln x - \frac{5}{36}x^3\right\}e^x$.
6. $x^2y'' - 6xy' + 10y = 3x^4 + 6x^3$; $y_1(x) = x^2$, $y_2(x) = x^5$. Ans: $y = y_c + y_p = c_1x^2 + c_2x^5 - \frac{3}{2}x^4 - 3x^3$.
7. $y'' + y = \tan^3 x$. Ans: $y = y_c + y_p = c_1 \cos x + c_2 \sin x + \frac{1}{2} \frac{\sin^3 x}{\cos x} - \frac{3}{2} \cos x \ln |\sec x + \tan x| + \frac{5}{2} \cos x \sin x + \frac{\sin x}{\cos x}$.
8. $y'' + y = \sec x$. Ans: $y = y_c + y_p = c_1 \cos x + c_2 \sin x + \cos x \ln |\cos x| + x \sin x$.