Math 3321 − Spring 2024   Name:

Homework #1

(1)[3Pts] Consider the differential equation

$$y'' - 16y = 0$$

Is any of the following functions a solution for the differential equation?
$y = \sin 4x$, $y = \sinh 4x$, $y = e^{-4x}$

(2)[3Pts] Find the real numbers r such that $y = e^{rx}$ is a solution of

$$y'' - 6y' + 9y = 0$$

(3)[3Pts] Verify that $y = c_1 e^{2x} + c_2 e^{-3x}$ is the general solution of $y'' + y' - 6y = 0$ and find the solution of the IVP with initial conditions $y(0) = 1$, $y'(0) = 1$.

(4)[3Pts] Find the general solution of

$$y' - 4y = e^{-x}$$

(5)[4Pts] Find the general solution of

$$x^2 y' + 5xy = x^{-3} \cos(3x)$$

(6)[4Pts] Find the general solution of

$$xy' - y = \frac{5}{2} x \ln x$$