

Math 54: Worksheet #21

Name: _____ Date: November 18, 2021

Fall 2021

Problem 1 (4.4 #20). Find a particular solution to the following differential equation:

$$y'' + 4y = 16t \sin 2t$$

Problem 2 (4.4 #28). Determine the form of a particular solution to the following differential equation:

$$y'' - 6y' + 9y = 5t^6 e^{3t}$$

Problem 3 (True/False). If y_p is a particular solution to $y'' + 4y' + 2y = f(t)$ and $c_1y_1 + c_2y_2$ is the form of the general solution to the homogeneous equation $y'' + 4y' + 2y = 0$, then every solution of the equation $y'' + 4y' + 2y = f(t)$ has the form $y_p + c_1y_1 + c_2y_2$ for some constants c_1 and c_2 .

Problem 4 (4.5 #2b). Given that $y_1(t) = \frac{1}{4} \sin 2t$ is a solution to $y'' + 2y' + 4y = \cos 2t$ and that $y_2(t) = t/4 - 1/8$ is a solution to $y'' + 2y' + 4y = t$, use the superposition principle to find a solution to the following equation:

$$y'' + 2y' + 4y = 2t - 3 \cos 2t.$$

Problem 5 (4.5 #25). Find the solution to the following initial value problem:

$$z'' + z = 2e^{-x}; \quad z(0) = 0, \quad z'(0) = 0.$$

Problem 6 (4.5 #35). Determine the form of a particular solution for the following differential equation:

$$y'' - 4y' + 5y = e^{5t} + t \sin 3t - \cos 3t$$