

Math 54: Worksheet #20

Name: _____ Date: November 16, 2021

Fall 2021

Problem 1 (True/False). The following initial value problem has a unique solution:

$$y'' + y' = 0; \quad y(0) = 2$$

Problem 2 (True/False). The equation $y'' - y^2 = 0$ is a linear, homogeneous, second-order equation.

Problem 3 (True/False). The equation $y' - \cos(x)y = 5$ is a linear, first-order equation.

Problem 4 (4.2 #19). Solve the given initial value problem:

$$y'' + 2y' + y = 0; \quad y(0) = 1, \quad y'(0) = -3$$

Problem 5 (4.2 #35a-b). Determine if the following functions are linearly dependent on $(-\infty, \infty)$:

(a) $y_1(t) = 1, y_2(t) = t, y_3(t) = t^2$

(b) $y_1(t) = -3, y_2(t) = 5 \sin^2 t, y_3(t) = \cos^2 t$

Problem 6 (4.3 #22). Solve the given initial value problem:

$$y'' + 2y' + 17y = 0; \quad y(0) = 1, \quad y'(0) = -1$$

Problem 7 (4.3 #29a). Find a general solution to the following higher-order equation:

$$y''' - y'' + y' + 3y = 0$$