

**Introduction to Differential Equations**  
**Assignment # 5**

Date Given: May 9, 2022

Date Due: May 16, 2022

**P1.** (1 point) Find a differential equation whose general solution is  $y = c_1 e^{-3t} \cos 4t + c_2 e^{-3t} \sin 4t$ .

**P2.** (3 points) Find the general solution of the following differential equations

(a)  $9y'' + 4y = 0$

(b)  $y'' - 4y' + 5y = 0$

(c)  $2y'' + 2y' + y = 0$

**P3.** (2 points) Find the solution of the initial value problem  $y'' - 2y' + 5y = 0$ ,  $y(\pi/2) = 0$ ,  $y'(\pi/2) = 2$ . Sketch the graph of the solution and describe its behavior for increasing  $t$ .

**P4.** (2 points) Use the method of Problem 34 in Section 3.3 (Euler's equations) to solve the following differential equations

(a)  $t^2 y'' + 4ty' + 2y = 0$  for  $t > 0$

(b)  $t^2 y'' + 2ty' + 0.25y = 0$  for  $t > 0$

**P5.** (1 point) Find the general solution of the differential equation  $25y'' - 20y' + 4y = 0$ .

**P6.** (2 points) Solve the initial value problem  $y'' - 6y' + 9y = 0$ ,  $y(0) = 0$ ,  $y'(0) = 2$ . Sketch the graph of the solution and describe its behavior for increasing  $t$ .