

**MATH 0290 SEC 1050 Introduction to Differential Equations**

HW #5 Due Friday September 25<sup>th</sup> 11:59pm EST

updated 9/19/2020 at 6:30pm EST-fixed a typo in number 4.3 #17 and 35

Questions from Polking, Boggess and Arnold, *Differential Equations with Boundary Value Problems*, second edition

Chapter 4.3 #1, 9, 17, 35

Chapter 4.4 # 1, 7

Chapter 4.3

1.  $y'' - y' - 2y = 0$  has real, characteristic roots. Find the general solution.
9.  $y'' + y = 0$  has complex, characteristic roots. Find the general solution.
17.  $y'' - 4y' + 4y = 0$  has repeated, real, characteristic roots. Find the general solution.
35. Find the solution of the initial value problem  $y'' + 12y' + 36y = 0$ ,  $y(1) = 0$ ,  $y'(1) = -1$ .

Chapter 4.4

1. (a) Use a computer or calculator to plot the graph of the function and (b) place the solution in the form of  $y = \cos(\omega t - \phi)$  and compare the graph of your answer with the plot found in part (a)  
$$y = \cos 2t + \sin 2t$$
7. Place the following equation in the form  $y = Ae^{-ct}\cos(\omega t - \phi)$ . Then, on the same plot, place the graphs of  $y = Ae^{-ct}\cos(\omega t - \phi)$ ,  $y = Ae^{-ct}$ , and  $y = -Ae^{-ct}$ . For the last two, use a different line style and/or color than for the first one.

$$y = e^{-\frac{t}{2}}(\cos 5t + \sin 5t)$$