

Name: \_\_\_\_\_

Homework 5 | Math 256 | Cruz Godar

*Due Wednesday of Week 6 at the start of class*

Complete the following problems and submit them as a pdf to Canvas. 8 points are awarded for thoroughly attempting every problem, and I'll select three problems to grade on correctness for 4 points each. Enough work should be shown that there is no question about the mathematical process used to obtain your answers.

## Section 5

In problems 1–6, solve the DE. If possible, verify that you've found the general solution with the Wronskian.

1.  $y'' + 6y' + 9y = 0$ .

2.  $ty'' + y' = 0$ .

3.  $y'' + 10y' + 26y = 0$ .

4.  $y'' - 2y' - 8y = 0$ .

5.  $y'' - 100y = 0$ .

6.  $y'' + 100y = 0$ .

In problems 7–8, solve the initial value problem and determine the behavior of the solution as  $t \rightarrow \infty$ .

7.  $y'' - 2y' + 17y = 0$ ,  $y(0) = 4$ ,  $y'(0) = -4$ .

8.  $y'' + 8y' + 16y = 0$ ,  $y(0) = 1$ ,  $y'(0) = 0$ .

9. One fundamental solution to  $ty'' - y' + t^3y = 0$  is  $y = \sin\left(\frac{t^2}{2}\right)$ . Find the other.

10. One fundamental solution to  $t^2y'' + ty' + y = 0$  is  $y = \sin(\log(t))$ . Find the other.

## Section 6

In problems 11–18, find the general solution to the DE.

11.  $y'' - 2y' - 3y = 8e^t$ .

12.  $y'' - 2y' - 3y = 8e^{3t}$ .

13.  $y'' + y = 3\sin(t) + e^t$ .

14.  $y'' + 6y' + 9y = 120t^2e^{-3t}$ .

15.  $4y'' + y = \sec\left(\frac{t}{2}\right)$ .

16.  $y'' + 2y' + y = 2t\sin(t)$ .

17.  $y'' + 4y' + 4y = t^{-2}e^{-2t}$ .

18.  $y'' + 3y' + 2y = \frac{1}{1 + e^t}$ .