

Math 240 - Homework 2

October 7, 2021

Name _____

Score _____

The following problems are from the suggested homework. Show all work to receive full credit. Supply explanations when necessary. This assignment is due October 12.

1. (2 points) Show that $y_1(x) = 1$ and $y_2(x) = \sqrt{x}$ are solutions of $yy'' + (y')^2 = 0$, but that their sum $y = y_1 + y_2$ is not a solution. Why is a linear combination of two solutions not a solution?

2. (2 points) Solve the Cauchy-Euler equation $x^2y'' + 2xy' - 12y = 0$.

Turn over.

3. (2 points) Solve the initial value problem.

$$y''' + 10y'' + 25y' = 0; \quad y(0) = 3, y'(0) = 4, y''(0) = 5$$

4. (2 points) Solve the Cauchy-Euler equation $x^2y'' + xy' + 9y = 0$.

5. (2 points) The equation of motion of a mass in a mass-spring system satisfies the equation

$$4x'' + 20x' + 169x = 0; \quad x(0) = 4, x'(0) = 16.$$

Determine the equation of motion. Write your final answer in terms of a single sine or cosine.