

MATH 2850: TEST 01 (25 points.)

NAME: _____

DUE: Wednesday, January 24th, at the beginning of class.

DIRECTIONS: Show all work.

1. Consider the DE: $x^2 y'' + 2x y' - 2y = 4x^2 + 3x$ with conditions: $y(1) = 0$, $y'(1) = 11$.

(a) What is the **order** of this differential equation? Explain.

(b) Is this differential equation **ordinary** or **partial**? Explain.

(c) Do the conditions create an **initial** or **boundary** value problem? Explain.

(d) Verify $y = 2x - 3x^{-2} + x^2 + x \ln(x)$ is a solution to the DE which satisfies the conditions.

2. (a) Verify $y = c_1 \cos(4x) + c_2 \sin(4x)$ is a two parameter family of solutions to $y'' + 16y = 0$.

(b) Find c_1 and c_2 which satisfy the ICs: $y(\pi) = 0$ and $y'(\pi) = 4$.

(c) What happens when you try to find c_1 and c_2 to satisfy the BCs: $y(0) = 0$ and $y(\pi) = 0$?

(d) What happens when you try to find c_1 and c_2 to satisfy the BCs: $y'(0) = 0$ and $y'(\pi) = 4$?

3. Verify $y = c_1 \cos(\omega x) + c_2 \sin(\omega x)$ is a two parameter family of solutions to $y'' + \omega^2 y = 0$.