

MAP 2302 TEST 1 - JAMES KEESLING

NAME _____

Do all problems. Each problem is worth 20 points. Partial credit will be given for correct reasoning when the final answer may be incorrect. Credit will be deducted if reasoning is wrong even if the final answer is correct.

Problem 1. Do three iterations of *Picard iteration* for the following differential equation. Start with $x_0(t) \equiv 2$ and determine $x_1(t)$, $x_2(t)$, and $x_3(t)$.

$$\frac{dx}{dt} = t \cdot x \quad x(0) = 2$$

Problem 2. Solve the differential equation $(x^3 + y) dx + (y + x + 3) dy = 0$.

Problem 3. Solve the differential equation $x^2 dx + xy dy = 0$.

Problem 4. What is the pressure 10 feet below the surface of the ocean? What is the pressure one mile under the surface of the ocean? Assume that the density of seawater is 1029 kg/m^3 ?

Problem 5. Solve the following differential equations.

$$\frac{d^2x}{dt^2} + 2\frac{dx}{dt} + 5x = 0$$

$$\frac{d^2x}{dt^2} - \frac{dx}{dt} - 2x = 0$$

$$\frac{d^2x}{dt^2} - 4\frac{dx}{dt} + 4x = 0$$