Problems Day 1, M 2/5/2024

Topic 1: Introduction to differential equations

Jeremy Orloff

Problem 1.

(a) Use separation of variables to solve $\dfrac{dy}{dx} = x(y-2)^2$.

(b) Verify that the solution $y(x) \equiv 2$ is also a solution. Explain why this solution was lost in the separation of variables in Part (a).

(c) Give the full solution to the DE.

(d) Verify your solution is a solution.

Problem 2. Solve $\dfrac{dx}{dt} = 3x$.

Problem 3. Give the DE modeling the effect of gravity on a falling mass m at height h above the Earth's surface. (h can be large.) Assume the mass is falling towards the center of the Earth.

ES.1803 Differential Equations

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