
Math 2150 - Homework # 2

First order ODEs - Theory

1. Show that the following first order initial value problem has a unique solution on some interval I containing the initial point x_0 .

(a) $\frac{dy}{dx} = y^{2/3}, y(0) = 2$

(b) $x \frac{dy}{dx} = y, y(2) = 0$

(c) $y' - y = x, y(1) = 2$

(d) $(4 - y^2)y' = x^2, y(0) = 0$

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2. (a) Show that $y = cx$ is a solution the $xy' = y$ for any constant c .
(b) Find at least two solutions to the initial value problem

$$xy' = y, \quad y(0) = 0$$

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3. (a) Show that $y = cx^2$ is a solution the $x \frac{dy}{dx} = 2y$ for any constant c .
(b) Find at least two solutions to the initial value problem

$$x \frac{dy}{dx} = 2y, \quad y(0) = 0$$
