Lesson 3.1 Vocabulary

Term	Definition	Example
Ordinary Differential Equation	An equation that involves a derivative.	$\dfrac{dy}{dx} + 3xy = 7\sin{(x)}$ $4t^2 \dfrac{dx}{dt} + 3x^2 = \ln{(t-x)}$ $\dfrac{d^2y}{ds^2} - 4s^2\sqrt{y}\dfrac{dy}{ds} + 3sy = 7$ $3x^2\dfrac{d^3y}{dx^3} - 4\sin(x)\dfrac{d^2y}{dx^2} + 3\sqrt{x}\dfrac{dy}{dx} - 7xy = \dfrac{1}{x}$
Partial Differential Equations	An equation that involves a partial derivative.	$3z^2\dfrac{\partial z}{\partial x} + 4y\dfrac{\partial z}{\partial y} = 4xyz$
Order	The order of the highest derivative in a differential equation.	The order of the following ODE is 2 $\dfrac{d^2y}{ds^2} - 4s^2\sqrt{y}\dfrac{dy}{ds} + 3sy = 7$
Independent Variable	The variable that represents the input of a function.	x is the independent variable in the equation $\dfrac{dy}{dx} + 3xy = 7\sin{(x)}$
Dependent Variable	The variable that represents the output of a function.	y is the dependent variable in the equation $\dfrac{dy}{dx} + 3xy = 7\sin{(x)}$

Linear Differential Equation	A differential equation that can be written in the following form: $$f_n(x)\frac{d^n y}{dx^n} + f_{\{n-1\}}(x)\frac{d^{n-1}y}{dx^{n-1}} + \cdots + f_2(x)\frac{d^2 y}{dx^2} + f_1(x)\frac{dy}{dx} + f_0(x)y = f(x)$$	$$\frac{7\sin^2(3x)}{\ln(\tan(x-1))}\frac{d^3 y}{dx^3} + x^2\frac{d^2 y}{dx^2} + 3\frac{dy}{dx} + \sqrt{x}\,y = x^2$$
Non-Linear Differential Equation	A differential equation that cannot be written in the above form.	$$\frac{d^2 y}{ds^2} - 4s^2\sqrt{y}\frac{dy}{ds} + 3sy = 7$$
Solution to a Differential Equation	An equation for the dependent variable that satisfies the differential equation.	$$x(t) = e^{0.2310t}$$ is the solution to the ODE $$\frac{dx}{dt} = 0.2310x$$
Slope Field	A graphical representation of multiple solutions of a differential equation	