0.1 Nerual networks and PDE's

Neural networks can be useful for solving differential equations, . The Universal approximation theorem states that, under certain conditions, a neural network may approximate any well behaved function to any given precision. A differential equation describes a function by relating it to one of its own derivatives (to some order). In this way they do not describe the function explicitly, but rather its properties, and our job becomes looking for functions that exhibit these properties and thus are solutions to the equation.

$$\frac{\mathrm{d}S}{\mathrm{d}t} = cR - \frac{aSI}{N}$$
$$\frac{\mathrm{d}I}{\mathrm{d}t} = \frac{aSI}{N} - bI$$
$$\frac{\mathrm{d}R}{\mathrm{d}t} = bI - cR$$

By [insert recipe. cost function?] we can let the neural network do this dirty work for us and give an approximate solution.

Reference: "https://compphysics.github.io/MachineLearning/doc/pub/odenn/pdf/odenn-minted.pdf"