

Differential equations

- Q1: What are they?
Q2: Why would you care?
Q3: What are we doing in this course?

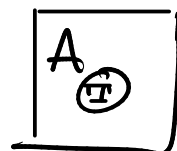
A1: A differential equation is an equation relating the derivatives of some quantities to other quantities.

A2: Since a derivative represents a rate of change, any quantitative problem involving rates of change necessarily involves differential equations of some kind.

A3: Because the concept of a differential equation is so broad, and touches so many disparate phenomena, we cannot solve all DEs. Instead we focus on specific cases that are tractable and that have interesting applications.

Example: Newton's Law of cooling

An object is immersed in a bath held at a fixed temperature A (ambient temperature)



Denote by T the temperature of the object. This is actually a function of time (t), since the object will cool or heat up to match the ambient temp A (tends toward thermodynamic equilibrium)