Lecture 1.2: Plotting Solutions to Differential Equations

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A motivating example

Consider the ODE involving a single-variable function $y(t)$: $y' = 2y + t$.

We don't know how to solve this (yet), but we can still visualize the "family of solutions."

Slope fields and isoclines

Consider the same ODE: $y' = 2y + t$.

Definition

An isocline is a line or curve on which y' is constant.

Isoclines

Another example: $\dfrac{dy}{dt} = y^2$.

Autonomous ODEs

> **Definition**
>
> An ODE is autonomous if $y' = f(y)$ for some function f.

Autonomous ODEs

> **Example**
>
> Sketch the slope field of the autonomous ODE $y' = (y+1)(y-2)(y-4)$.