Math 302

Chapter 1

Section 1.3: Direction Fields For First Order Equations

Contents

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What Is A Direction Field?

Consider the following first order ODE:

$$y'(x) = f(x, y(x)).$$

If you use this information well, you can get these pictures.

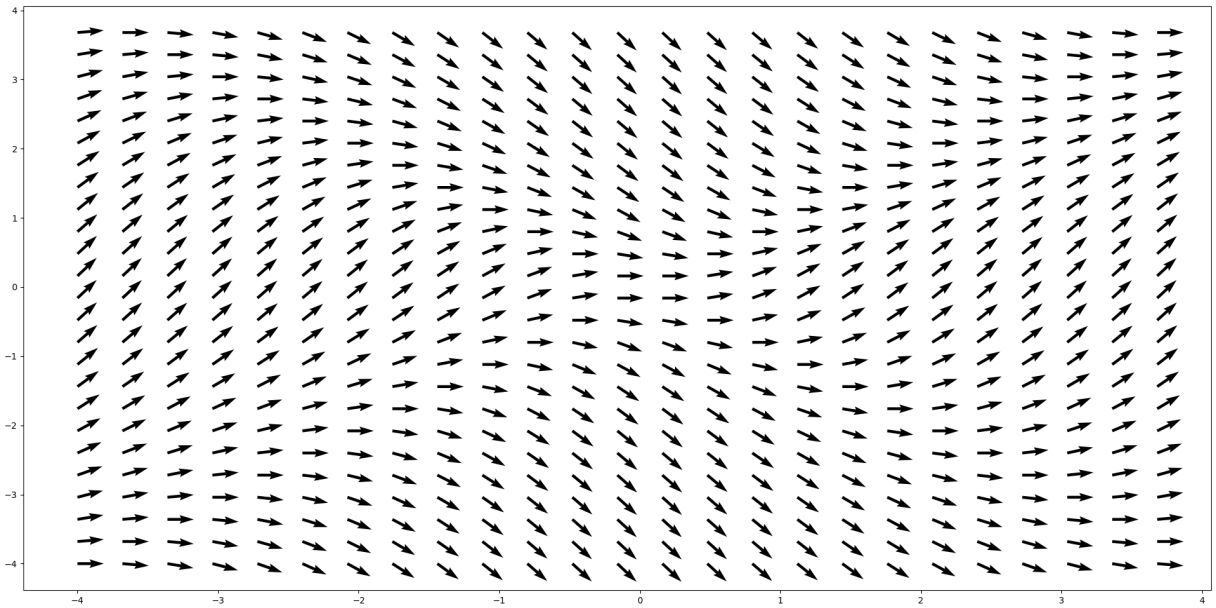

Figure 1: Direction field of $y' = \frac{x^2-y^2}{1+x^2+y^2}$.

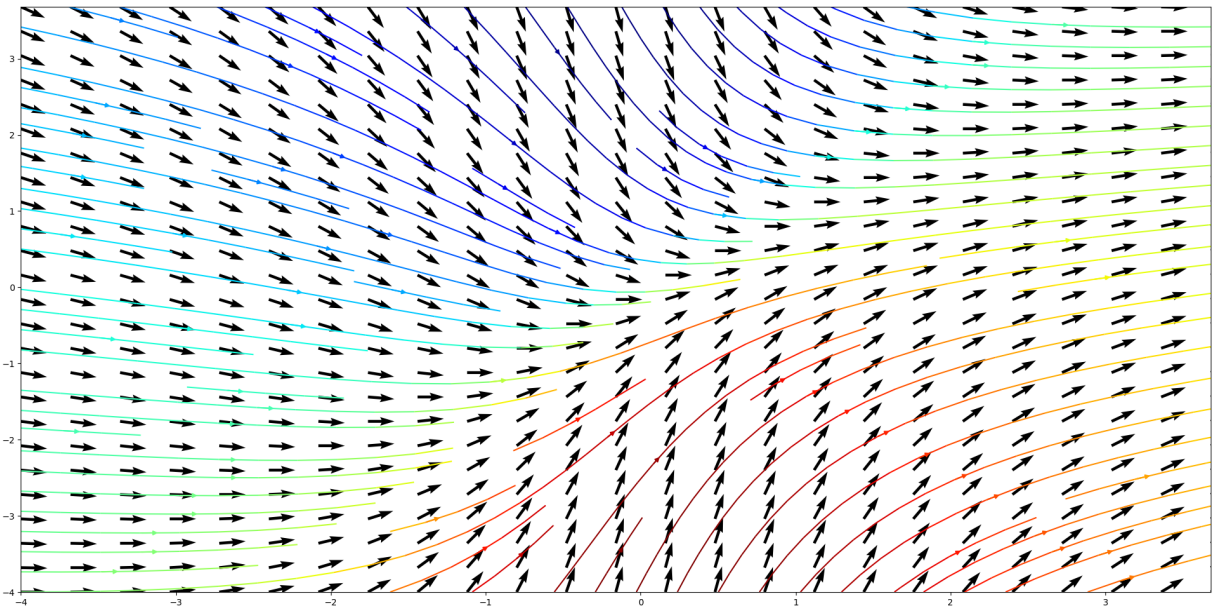

Figure 2: Direction field of $y' = \frac{x-y}{1+x^2}$.

EXAMPLE 1. Draw the direction field of the following ODE:

$$y' = 1 + xy^2.$$

1. Create a rectangular grid.

2. Find the slopes in each points of the grid (nods).

3. Draw the actual direction field.