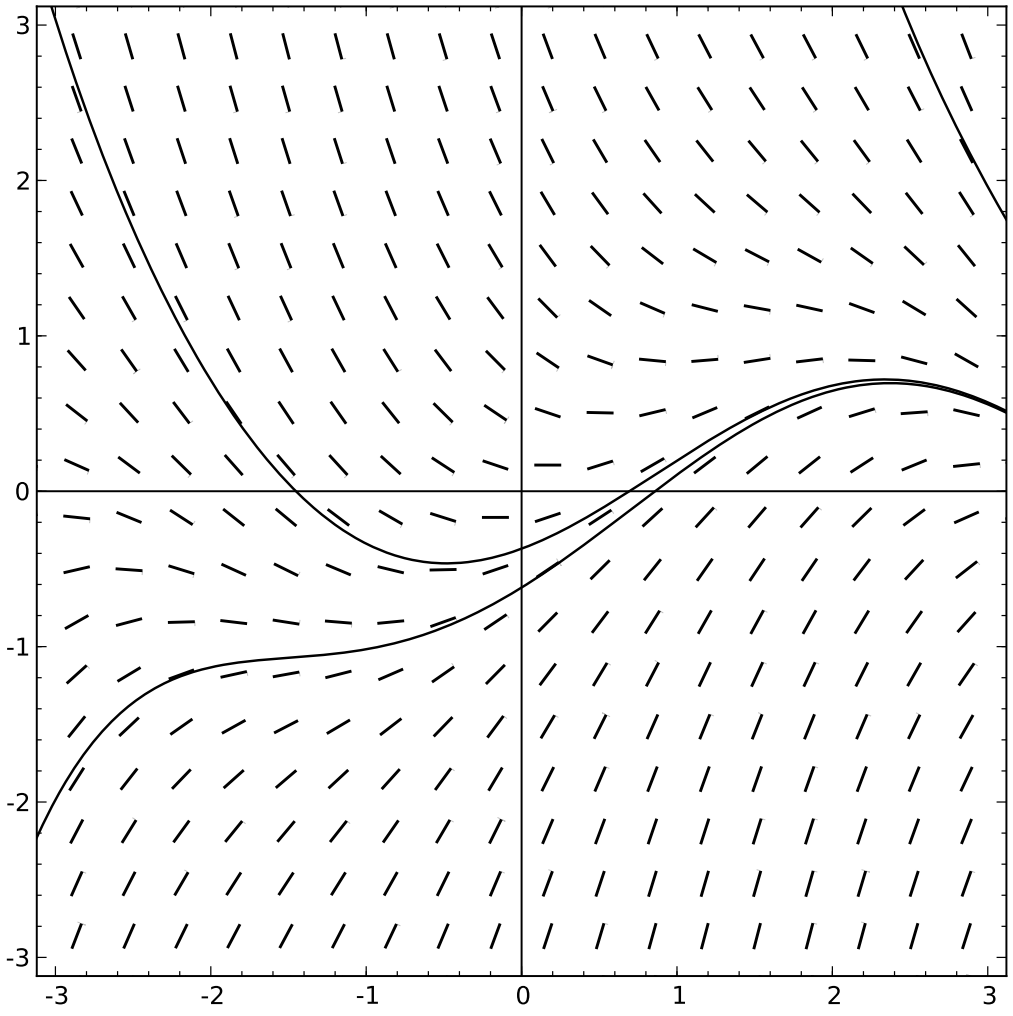
Math 3280 Worksheet 2: Slope fields.

Group members (2 to 4): _____

Only hand in 1 sheet per group.

(1) Sketch in approximations to the solution curves $y(x)$ with initial conditions $y(-3) = 1$ and $y(3) = 1$. Three other solutions are shown already. This slope field is smooth, and every initial condition generates a unique solution, which means that distinct solutions will never touch or cross each other.

(The first initial condition, with $x = -3$, is on the left hand edge, while the second (distinct!) initial condition is at $x = 3$, the right hand edge.)



(2) Match the following ODEs to the graphs below, which show some representative solutions. In each plot, the x-axis is horizontal and the y-axis is vertical. For each match briefly explain your reasoning.

(a) $y' = \sin(xy)$

(b) $y' = y^2 - 1$

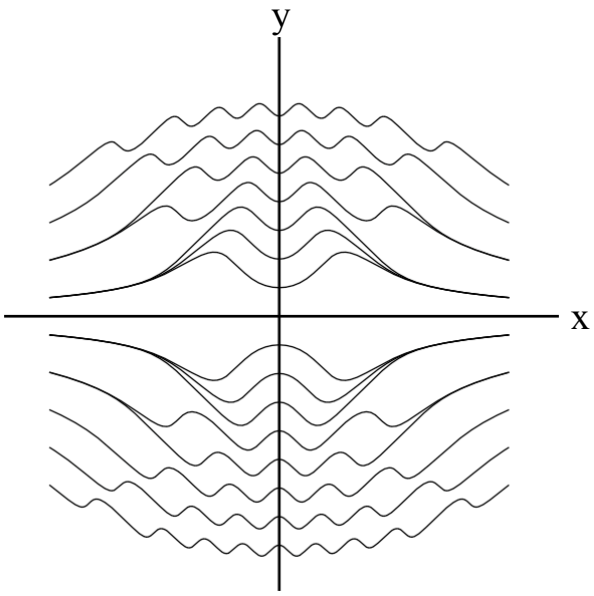
(c) $y' = 2x + y$

(d) $y' = \sin(x)\sin(y)$

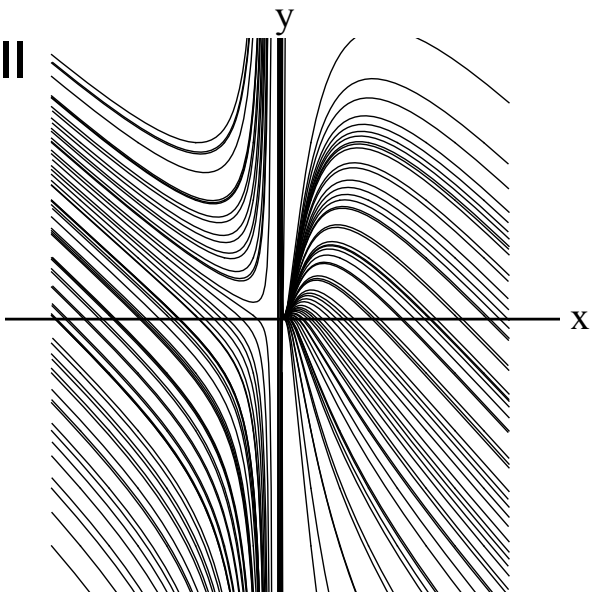
(e) $y' = y/x^2 - 1$

(f) $y' = \sin(3x)$

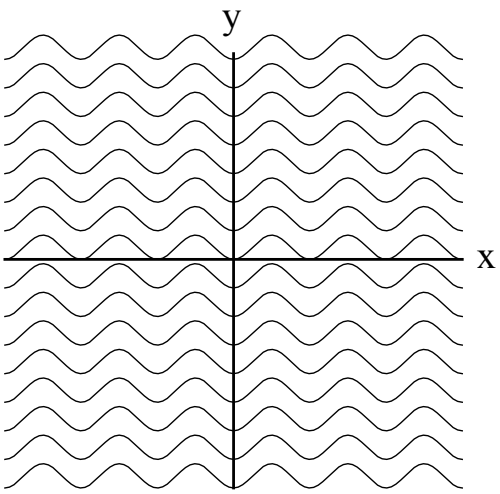
I



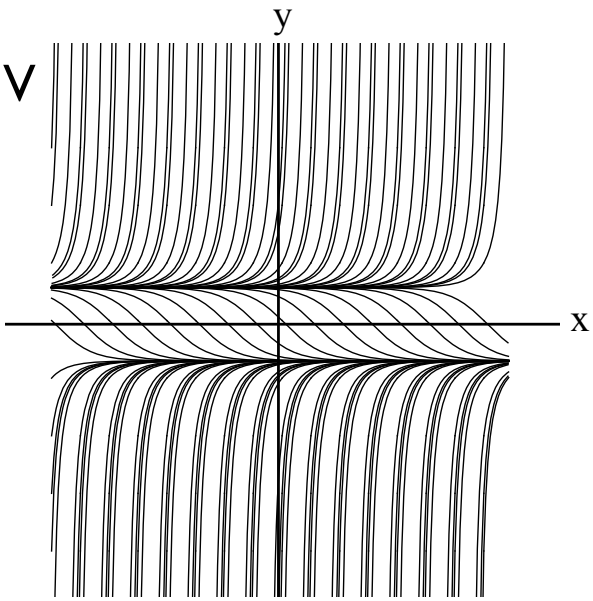
II



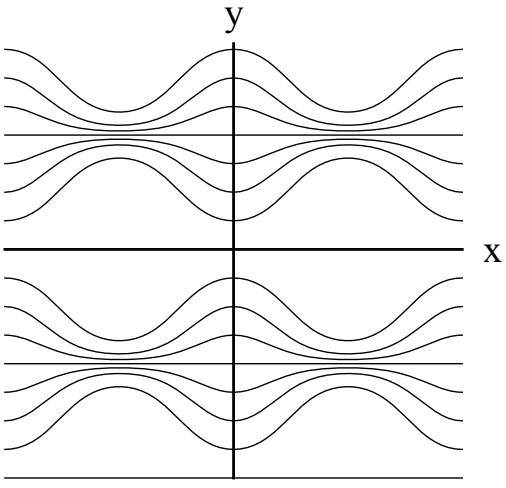
III



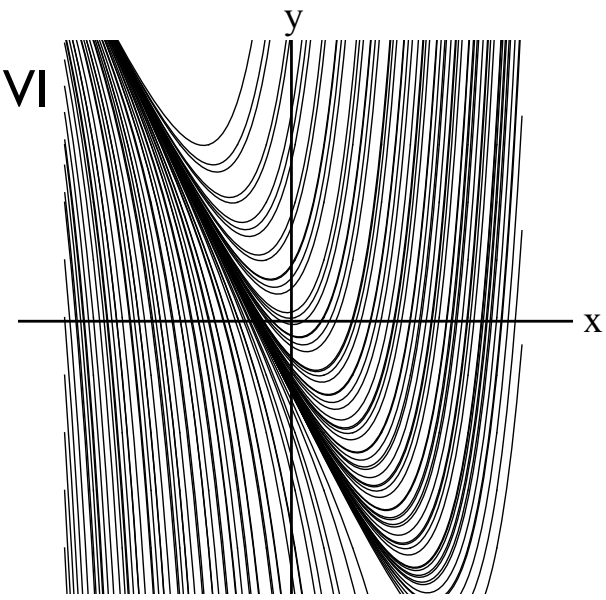
IV



V



VI



(3) Does the initial value problem $\frac{dy}{dt} = 3y^{2/3}$, $y(1) = 1$ have a unique solution? Find a solution and determine the largest interval of t values on which it is defined.

(4) Repeat the above problem, but this time with an initial value $y(1) = 0$.