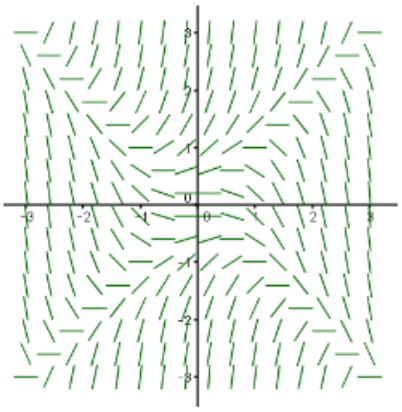
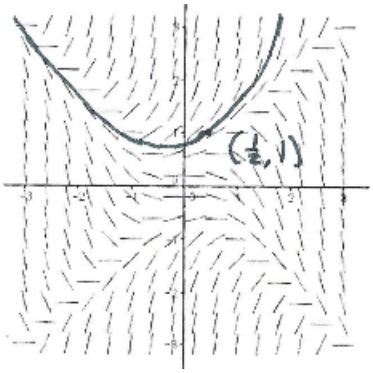
Section 8.2: Direction fields

Group work:

Problem 1 *The following is a direction field for the differential equation* $\dfrac{dy}{dx} = y^2 - x^2$.



Sketch the solution such that $y\left(\dfrac{1}{2}\right) = 1$.



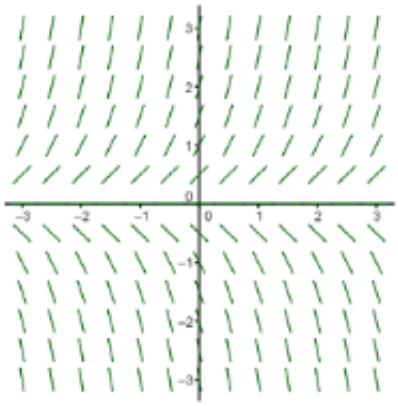
Solution:

Learning outcomes:

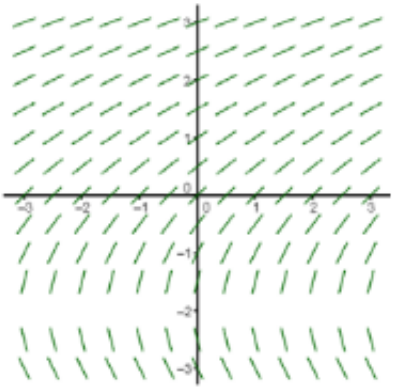
Problem 2 *Which of the following direction fields is the direction field corresponding to the differential equation* $y' = 1 + y^2$*?*

b.

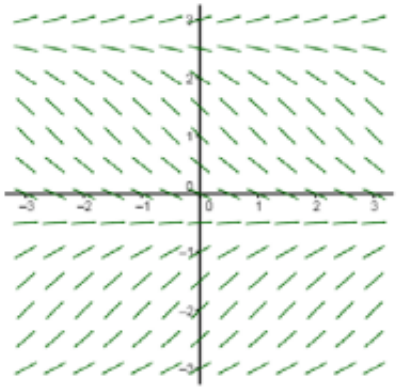
b.



c.



d.



Solution: *Look along the line* $t = 0$ *(the* y*-axis).*

Here $y' = 1 + y^2$*, so there is no* t *on the right hand side of the equation. Therefore,* y' *depends only on* y*. At* $y = 0$ *the slope is* 1*, then as* y *increases the slopes increase too. Similarly, as* y *gets more and more negative, the slope gets more and more positive. So it seems as if this direction field is (a).*