

## Homework #3: Sections 2.1

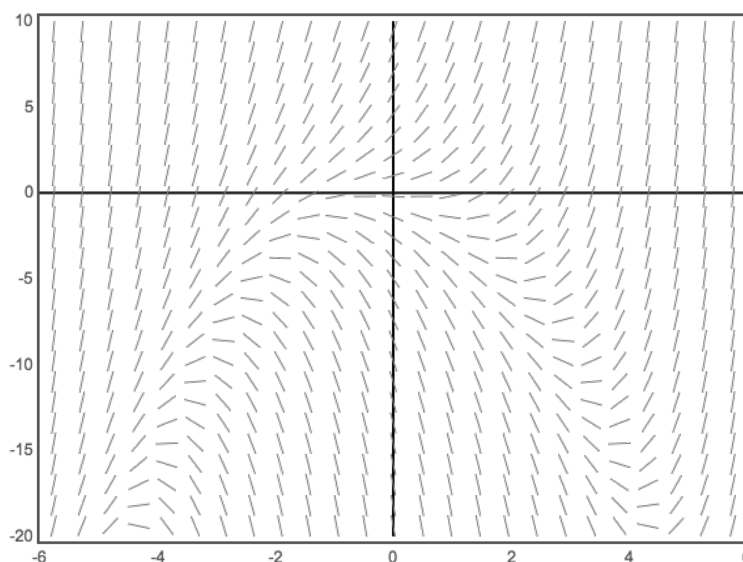
1. The direction field for

$$\frac{dy}{dx} = x^2 + y$$

is given below. Consider the following initial conditions

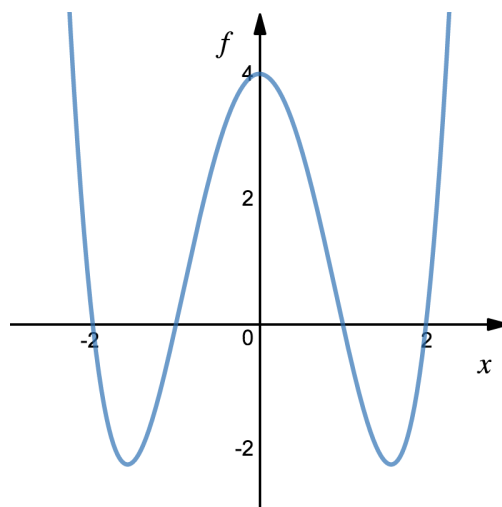
$$(a) y(0) = -10 \quad (b) y(0) = 0 \quad (c) y(-4) = 0 \quad (d) y(4) = 0$$

For each condition, sketch a solution curve to the differential equation that satisfies that condition.

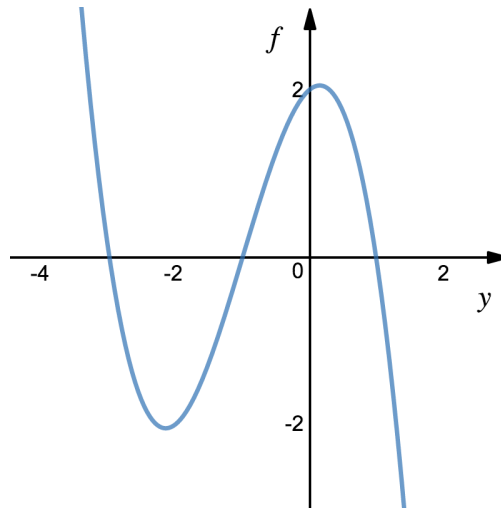


2. The function
- $f(x)$
- is plotted below. By hand, sketch a direction field over an appropriate grid for the DE

$$\frac{dy}{dx} = f(x)$$



3. The function  $f(y)$  is plotted below.



(a) Sketch a direction field over an appropriate grid for the DE

$$\frac{dy}{dx} = f(y) \tag{1}$$

(b) Use the graph to locate the critical points of and sketch a phase portrait **1**.

(c) Sketch typical solution curves in the subregions in the  $xy$ -plane determined by the graphs of the equilibrium solutions. (Make sure to include the equilibrium solutions!)