

## §1.3 Separable Differential Equations

**Goals**

- To understand that direction fields and phase lines are a useful way of analyzing a differential equation from a geometric point of view, especially since not all differential equations can be solved analytically.
- to understand that an autonomous equation is a differential equation of the form  $y' = f(y)$  and that we can use a phase line to analyze autonomous differential equations.
- To understand and be able to classify equilibrium solutions (sinks, sources, or node)s to a differential equation  $y' = f(y)$  are these solutions given by  $f(y) = 0$  for all  $y$  and that any solution must be constant. (*Technology may be useful here.*)

**To Prepare for Class on §1.3**

1. Read §1.3 Geometric and Quantitative Analysis through Example 1.3.2.
2. Plot a direction field for  $y' = 3 + y$  and then plot solution curves for the initial values  $y(0) = 1$  and  $y(0) = 1/3$ . What do you notice about the direction field and the solution curves?