2.1: Solution curves w/o a solution

(A) Direction Fields

$\frac{dy}{dx} = f(x,y)$ is a slope/flow fct.

on rect. grid.

evaluate on an int. grid to generate a direction/slope field.

see Notebook.

ex1: create a direction field

for $\frac{dy}{dx} = x + y$ on $[-2,2] \times [-2,2]$

(B) Autonomous 1st-order DEs.

Dfn: $\frac{dy}{dx} = f(y)$ ← No x

ex1: phase portrait of

$$\frac{dy}{dx} = -y(3+y)$$

phase portrait of...

ex 2: $\dfrac{dy}{dx} = 2y^2 + 5y - 3$

vocab: attractors and repellers. (semi-stable)

Direction fields of autonomous DEs

slopes of lineal elements on a
vertical line vary

slopes of lineal
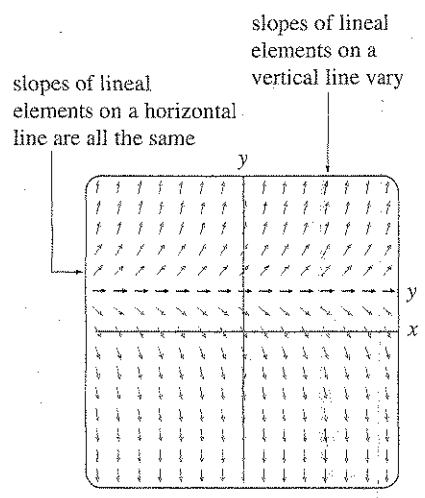elements on a horizontal
line are all the same

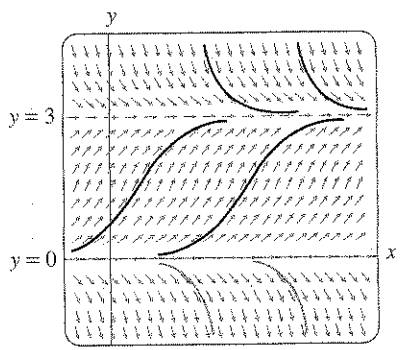FIGURE 2.1.10   Direction field for an autonomous DE

Translated solutions

FIGURE 2.1.11   Translated solution curves of an autonomous DE

revisit ex1 & ex2 and draw possible solns.