Phase Portraits for Autonomous Systems

Plot an autonomous system of two ODEs, including the direction field, critical point(s), and phase portraits as desired.

Instructions

- To begin, enter the necessary information into the fields below:
  - the bounds for the plot window
  - $F(x, y)$ and $G(x, y)$, the right-hand sides of the autonomous ODEs $\dot{x} = F(x, y)$ and $\dot{y} = G(x, y)$
  - one equilibrium (critical) point as a list $[a, b]$, and multiple such points in a sequence $[a, b]$, $[c, d]$
  - bounds for t, the independent variable of the ODEs, and hence, the parameter along orbits (trajectories or paths)
- Click the **Enter Data** button to obtain a direction field and all entered equilibrium (critical) points.
- Click on the plot area and select the Click and Drag Manipulator ( ) from the Plot menu or plotting toolbar. Then click anywhere in the direction field to create a phase portrait through that point.
- The **Erase Phase Portrait** button erases all orbits and field arrows. The **Clear All** button clears every field in the template.

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Plot Window

$-6 \le x \le 15$,

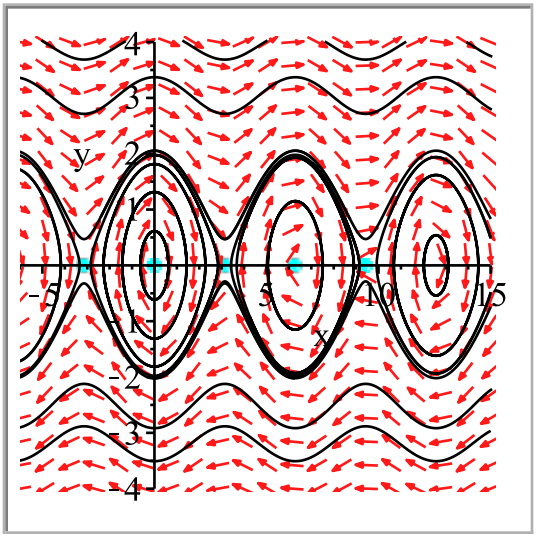
$-4 \le y \le 4$

Differential Equations

$\dot{x} = F(x, y) =$ y

$\dot{y} = G(x, y) =$ $-\sin(x)$

Equilibrium (Critical) Points



Erase Phase Portrait

Clear All

[Pi, 0], [−Pi, 0], [0, 0], [2·Pi, 0], [3·Pi, 0]

Parameter

−10 $\leq t \leq$ 10

Enter Data