

## Exercise 2.7.2

For each of the following vector fields, plot the potential function  $V(x)$  and identify all the equilibrium points and their stability.

$$\dot{x} = 3$$

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### Solution

The potential function  $V(x)$  satisfies

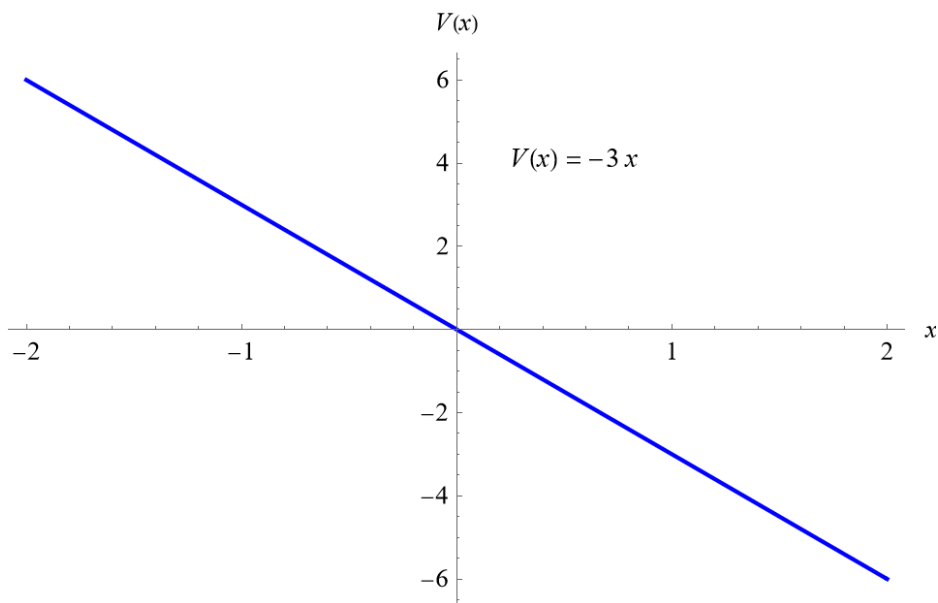
$$\dot{x} = 3 = -\frac{dV}{dx}.$$

Multiply both sides by  $-1$ .

$$\frac{dV}{dx} = -3$$

Integrate both sides with respect to  $x$ , setting the integration constant to zero.

$$V(x) = -3x$$



The graph of  $V(x)$  versus  $x$  is to be thought of as a two-dimensional rollercoaster. A particle placed anywhere on the curve will roll indefinitely to the right because the slope is never zero; in other words, there are no equilibrium points.