

**Problem 1.** Consider the following system of differential equations:

$$\begin{aligned}\dot{x} &= v, \\ \dot{v} &= -\frac{dV}{dx},\end{aligned}$$

where  $V(x)$  is plotted below. Below the graph of  $V(x)$ , sketch a phase portrait of this system. In your phase portrait, sketch all qualitatively different trajectories, label any equilibria, and clearly indicate any heteroclinic or homoclinic orbits.

