

## Matlab Exercise

Simulate a particle in  $R^2$  subject to a potential field,  $\phi(x)$ , using ODE45 to numerically solve the differential equation

$$\dot{x} = -\nabla\phi(x)$$

for arbitrary initial condition  $x(0)$ . As a starting point, use the examples:

(a)  $\phi(x) = \frac{1}{4}x_1^4 + \frac{2}{3}x_1^3 - \frac{3}{2}x_1^2 + \frac{1}{2}x_2^2$

(b)  $\phi(x) = a(1 - \cos x_1) + \frac{1}{2}x_2^2$

Create contour plots to identify and characterize limit points. Generate a set of sample trajectories for each example from well-chosen initial conditions.