

$$\min_u x_3\left(\frac{\pi}{2}\right)$$

$$s. t. \quad \frac{dx_1(t)}{dt} = x_2(t)$$

$$\frac{dx_2(t)}{dt} = u(t)$$

$$2 \frac{dx_3(t)}{dt} = x_2(t)^2 - x_1(t)^2$$

$$x(0) = [0, 1, 0]$$

$$-1 \leq u(t) \leq 1$$

Compare to Exact Solution:  $u(t) = -\sin(t)$