

## Assignment 7

due: Thursday, May 3, in class

**Problem 1:** Consider  $\min \int_{t_0}^{t_1} \sqrt{1 + \dot{x}^2} dt$  and the initial conditions  $x(t_0) = x_0$  and  $x(t_1) = x_1$ .

- Find the solution.
- Graph the solution.
- What did you minimize?

**Problem 2:** Solve the problem  $\max \int_0^T e^{-t/10} (0.01tx - \dot{x}^2) dt$  given initial conditions  $x(0) = 0$  and  $x(T) = S$ .

**Problem 3:** Solve the problem  $\max \int_0^1 (10 - \dot{x}^2 - 2x\dot{x} - 5x^2)e^{-t} dt$ , given  $x(0) = 0$  and

- $x(1) = 1$ ,
- or  $x(1) = \text{free}$ .