

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 $x(t_1) = x_1$.

- a) Find the solution.
- b) Graph the solution.
- c) 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

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