

DL book

1. Read Chapter 2 (Liberzon) upto and including section 2.5.2
2. Exercise 2.2 DL book
3. Exercise 2.5 DL book
4. Paulsen's Mylar balloon paper
- justify transversality condition
5. Derive a calculus of variations formulation of the optimal control problem

(*) $\dot{x}_1 = v \cos(x_3); \dot{x}_2 = v \sin(x_3); \dot{x}_3 = u$
 Min $\int (u^2 + v^2) dt$
 subject to (*)
 and fixed end point conditions.

Then derive Euler Lagrange equation for this formulation. [HINT: there are 2 Lagrange multipliers]

6. Read P.D. Lax paper (1995) on "short path to shortest path"
7. Suppose the $n \times n$ matrix $A = D + L + U$ (with diagonal part D and strict lower and upper triangular parts L and U respectively), is diagonally dominant:

$$|a_{ii}| > \sum_{\substack{j=1 \\ j \neq i}}^n |a_{ij}| \quad i=1, 2, \dots, n.$$

Then show that $T = D^{-1}(L+U)$ is a contraction map on all \mathbb{R}^n . What is f ?