BOSTON COLLEGE
Department of Economics

EC 712 Dynamic Optimization M. Kraus

Text: Kamien, M.I. and Schwartz, N.L. (1991). *Dynamic Optimization*, 2nd edition.

I. Calculus of Variations

A. Simplest Problem

Kamien and Schwartz, Part I, Sections 1 and 3.

B. Free End Values

Kamien and Schwartz, Part I, Section 8.

C. More than One Function

Kamien and Schwartz, Part I, Section 18.

D. Euler Equations in Discrete Time

Sargent, T.J. (1979). *Macroeconomic Theory*, Chapter IX, Section 8.

II. Optimal Control Theory

A. Basic Problem

Kamien and Schwartz, Part II, Sections 1, 2 and 5.

B. Specified Terminal States

Kamien and Schwartz, Part II, Section 6.

C. Free Terminal Time

Kamien and Schwartz, Part I, Section 9.

Mills, E.S. and de Ferranti, D.M. (1971). "Market Choices and Optimum City Size," *American Economic Review Proceedings*, 61, 340-345.

D. Salvage Value (Terminal Costs)

Kamien and Schwartz, Part I, Section 11.

E. Bounded Controls: The Maximum Principle

Kamien and Schwartz, Part II, Section 10.

F. Discounting and Current Value Hamiltonians

Kamien and Schwartz, Part II, Section 8.

G. Discontinuous Controls

Kamien and Schwartz, Part I, Section 13, and Part II, Section 12.

H. Infinite Horizon Control Problems

Halkin, H. (1974). "Necessary Conditions for Optimal Control Problems with Infinite Horizons," *Econometrica*, 42, 267-272.

Michel, P. (1982). "On the Transversality Condition in Infinite Horizon Optimal Problems," *Econometrica*, 50, 975-985.

I. The Maximum Principle in Discrete Time

Dixit, A.K. (1990). *Optimization in Economic Theory*, 2nd edition, Chapter 10.

III. Dynamic Programming

A. Bellman's Principle of Optimality

B. Optimization in Discrete Time: Bellman's Recurrence Equation

Dixit, Chapter 11, *The Bellman Equation.*

C. Optimization in Continuous Time

1. An Economic Interpretation of Optimal Control Theory

Dorfman, R. (1969). "An Economic Interpretation of Optimal Control Theory," *American Economic Review*, 59, 817-831.

2. The Hamilton-Bellman-Jacobi Equation

Kamien and Schwartz, Part II, Section 21.

Dixit, Chapter 11, *Continuous Time*.

IV. Dynamic Optimization Under Uncertainty

A. Optimization in Discrete Time

1. Stochastic Dynamic Programming

Dixit, Chapter 11, *Uncertainty*.

2. Stochastic Euler Equations

Sargent, Chapter XIV, Section 1.

B. Optimization in Continuous Time

1. The Ito Calculus

   Merton, R.C. (1990). *Continuous-Time Finance*, Chapter 3.

2. Stochastic Dynamic Programming

   Merton, Chapter 4.