

EE320 (2/2012)

INTRODUCTORY MATHEMATICAL ECONOMICS

NONLINEAR MODEL AND DIFFERENTIAL CALCULUS
IN ECONOMIC THEORY

(Part 2 – Examples in Economics)

Topics

- Derivative and Marginality
- Relations among the total, the average, and the marginal functions
 - TR, AR, and MR
 - Elasticity, TR, and MR
 - TP, AP, and MP
 - TC, AC, and MC

Derivative and Marginality

- In economics, *marginality* indicates a rate of change – how much *the value of the function* changes as the *choice variable* (independent variable) increases by one unit.
- Examples:

	Level	Average	Marginal
Production	TP	AP =	MP
Revenue	TR	AR =	MR = MRP =
Cost	TC	AC =	MC = MFC =
Consumption	C	APC	MPC
Saving	S	APS	MPS
Investment	I		MPI

Total, Average, and Marginal Revenue

- Total Revenue: $TR = P \times Q$.
- Demand function: $Q_d = a - bP$.
 - Example: $Q_d = 250 - 10P$.
- $TR = f(Q) =$
 - $AR = ?$
 - $MR = ?$

Elasticity, Total Revenue, and Marginal Revenue

- From above, $MR = AR + Q \cdot \frac{dP}{dQ}$

- If $|E_d| > 1$ (elastic), MR _____
- If $|E_d| < 1$ (inelastic), MR _____
- If $|E_d| = 1$ (unitary elastic), MR _____

Example: Elasticity, MR, and AR

- Suppose $TR = 25Q - 0.01Q^2$

Total, Average, and Marginal Product

- Consider a short-run production: $Q = g(L)$
 - AP
 - MP
 - Relation between AP and MP:

 - Marginal Revenue Product: MRP

Total, Average, and Marginal Cost

- $TC = FC + VC = a + f(Q) = C(Q)$
- AC
- MC
- Relation between AC and MC:

- Marginal Factor Cost: MFC