

Level Curves & Total Derivatives

ECON 105: Intro to Mathematical Economics

Patrick Molligo

UCLA

Fall 2025

Agenda

- 1 Review
- 2 Level curves
- 3 Total differentiation
- 4 Practice problems

Quiz: Problem set 1

How was the first problem set?

Concepts so far

- Function rules
 - Exponents and logs
- First & second derivatives

Exponent Rules

Rule	Example
1) $x^a x^b = x^{a+b}$	$x^5 x^3 = x^8$
2) $(x^a)^b = x^{ab}$	$(x^5)^3 = x^{$

Log Rules

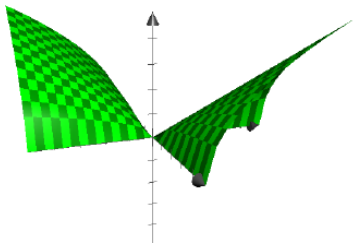
Special function: $\min(x_1, x_2)$

- A “minimum” or “Leontief” function has the form:
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Level curves

- A level curve of a function $y = f(x_1, x_2)$ is the curve of points <

Level curves visualized: $z = (yx)^{1/2}$



Solving for level curves

- When given a utility function we can reduce the equation to 2 dimensions
- Set <

Solving for level curves

$$x_2 = \bar{U} - \sqrt{x_1}$$

Total differentiation

- For functions of 2+ variables the **total differential/derivative** is:
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Total differentiation: examples

Find the total derivative of the following functions:

Total differentiation in economics

- We can use total differentiation to find the **Marginal Rate of Substitution (M**

Total differentiation in economics

- We can use total differentiation to find the

Total differentiation practice

Find $\frac{dx_2}{dx_1}$ for the following utility function:

Lagrange practice

$$\begin{aligned} \max_{x_1, x_2} U(x_1, x_2) &$$

Lagrange practice