

[Glossary] [Partial Differentiation of Functions of Function and Implicit Function]

Subject:

Course:

Paper No. & Title:

Business Economics

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Paper – 631 Advanced Mathematical Techniques

Unit No. & Title:

Unit – 2 Function of Two Variables

Lecture No. & Title:

Lecture – 2 Partial Differentiation of Functions of Function and Implicit Function

Glossary

- The change in u due to a small change in t will be linear sum of these two effects and it is called the *total derivative* of u with respect to t.
- For u = f(x,y), x = g(t), y = h(t) where t is the independent variable. The *first order total differentiation* is given by

$$\frac{du}{dt} = \frac{\partial u}{\partial x}\frac{dx}{dt} + \frac{\partial u}{\partial y}\frac{dy}{dt}$$

For u = f(x,y), x = g(t), y = h(t) where t is the independent variable. The *second order total differentiation* is given by

$$\frac{d^2 u}{dt^2} = u_{xx} \left(\frac{dx}{dt}\right)^2 + u_{yy} \left(\frac{dy}{dt}\right)^2 + u_x \frac{d^2 x}{dt^2} + u_y \frac{d^2 y}{dt^2} + 2u_{xy} \frac{dx}{dt} \frac{dy}{dt}.$$

- A function is said to be *homogeneous* function of degree n if f(tx,ty) = tⁿf(x,y).
- Euler's Theorem: Let u = u(x,y) be a homogeneous function of degree n. Then xu_x + yu_y = nu.
- Let q_a = u(P_a, P_b) where q_a is the quantity of good A demanded, P_a is its price, and P_b is the price of good B.

Price elasticity is defined as $\eta = -\frac{\partial q_a}{\partial P_a} \frac{P_a}{q_a}$.