Intermediate Microeconomics (Fall 2023)
Lecture 6
Production

Part I

Big Map of Microeconomics

Part II

Production

① _____ – _____ of _____:
_____ (_____), _____ (_____), _____,
_____, etc.

- _____
  - _____ (_____)
    – Those _____ to production that are themselves _____, basically are _____ of one sort or another, e.g., _____, _____, _____. Broadly referred to as _____.
  - _____ – The _____ used to _____ or _____ a _____.

② _____: _____

③ _____ – _____ of _____ into _____.

- **Production Function** – _____ that describes the _____ with a given set of _____.
  - Production functions are different because of _____ in _____.
  - Assume production function is _____.

  ⇒ _____

  ⇒ For given unit of _____, a certain amount of _____ and a certain number of _____ will produce a certain amount of _____.

- **Fixed and Variable Factors**
  - Fixed Factors – Factors whose _____ is _____ of the _____ of _____.
  - Quasi-Fixed Factors – Factors that must be used in a _____, as long as the _____ is _____.
  - Variable Factors – Factors whose _____ used _____ as the _____ of _____.

- **Time Frame**
  - _____ – Period of time during which _____ is _____.
  - _____ – Period of time during which _____ are _____.

- **Measures of Production**
  - **Total Product (TP)** – _____ level of _____ possible with a given set of _____ assuming _____ by workers.
    - _____
  - **Average Product (AP)**
    - _____
    - _____
  - **Marginal Product (MP)** – The _____ of the _____.
    - _____
    - _____

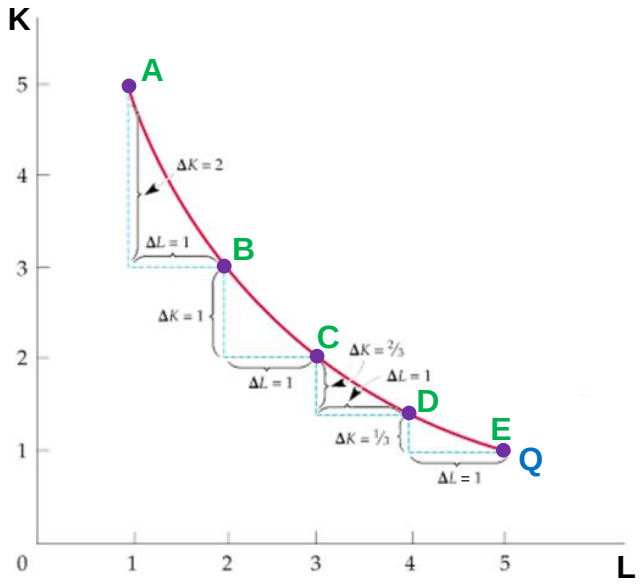
- **Marginal Rate of Technical Substitution (MRTS, also called the Technical Rate of Substitution, denoted by _____)** – _____ the _____ of _____ _____, i.e., the _____ between _____ in production. Mathematically defined as a _____ whose _____ is the _____ at which _____ when _____ of _____ is _____, so that _____.

- **Isoquant (IQ)** – A curve showing _____
  of _____ that _____ the _____
  of _____.

  - Point A: _____
  - Point B: _____

- **The Slope of IQ** – The _____.

- **The Shape of IQ** – _____ (_____).



_____:

the _____ of a _____ will _____ and _____, and eventually _____ as _____ is used in the _____.

⇒ _____: As we move along an IQ A → B → C, _____. Because the _____ of any _____ is _____. As _____ is _____ to the production process _____, the _____ of _____; when _____ is _____, the _____ of _____ – production needs a _____ of _____.

⇒ _____ the _____ of _____.

- **Isoquant Map** – A graph _____
  that _____.

Part III

Short-Run Production

- Suppose that Factor 2 is fixed at $\bar{x}_2$ in the short-run

  ⇒ The production function in the _____ is given by

  _____

Law of diminishing marginal returns

⇒ The short-run production function gets _____ as the amount of Factor 1 _____

Part IV

Long-Run Production – _____.

- **Different Types of Production Function**
  - **Linear**

    _____

    Linear production function

    ⇒ _____

    ⇒ _____

    ⇒ _____

    ⇒ _____ and _____ are _____

- **Leontief**

  _____

  _____ production function

  ⇒ _____ of _____ a

  _____ of _____ and _____,

  _____

  _____

  ⇒ _____ and _____

  ⇒ _____

  ⇒ _____

- **Cobb-Douglas**

  _____

  where _____ are _____,

  _____, _____, _____.

  _____ and

  _____, but _____

  ⇒ _____

Part V

Returns to Scale

_____

① If _____

⇒ _____

② If _____

⇒ _____

③ If _____

⇒ _____

- **In General**
  - Increasing Returns to Scale: _____, for all _____.
  - Constant Returns to Scale: _____, for all _____.
  - Decreasing Returns to Scale: _____, for all _____.

- **Figures of Returns to Scale**
  - Figure of Constant Returns to Scale

  - Figure of Increasing Returns to Scale

- Figure of Decreasing Returns to Scale

- Something to note:

① For _____ that are relatively _____, expect _____ to show _____ returns to scale.

② _____ have _____ to _____ returns to scale.

③ _____ will _____ with _____ returns to scale.

- **Returns to Scale with Cobb-Douglas Production Function**

  _____

  - _____ ⇒ _____ returns to scale
  - _____ ⇒ _____ returns to scale
  - _____ ⇒ _____ returns to scale

Example 1

$Q = 5K^{0.8}L^{0.4}$

- Why does increasing returns to scale exist?

  ① _____
  _____.

  ⇒ _____ is _____
  due to _____ and _____
  to _____
  as well as _____.

  ② Sometimes the _____ simply _____
  _____ to
  _____ the _____.

- If increasing returns to scale is prevalent, why not every industry is dominated by just a few firms?

  Because _____ returns to scale _____ as well.
  _____ when
  the effect of _____ returns to scale gets _____ and/or
  the effect of _____ returns to scale becomes _____.

  Two main causes of decreasing returns to scale:

  ① _____ of _____
  _____.

  ② _____ of _____
  and _____.

Exercise 1

Which of the following production functions exhibits constant returns to scale?

A. $q = KL$
B. $q = KL^{0.5}$
C. $q = K + L$
D. $q = \log (KL)$