Review Notes – Production and Costs

- **Short-Run Production.**
  - **Definitions.**
    - What is the short-run in production?
    - Total Product of Labor (TPL), what does it look like in a graph?
    - \( MP_L = \frac{\text{change in TPL}}{\text{change in } Q} \div \text{change in } L \). What is \( MP_L \)? What is the relationship between TPL and \( MP_L \)?
    - \( AP_L = \frac{\text{TPL}(Q)}{L} \). What is \( AP_L \). What is the relationship between \( MP_L \) and \( AP_L \)?
  - The law of diminishing marginal productivity As the use of labor increases in the short-run, ceteris paribus, the output produced by the last worker hired must eventually fall why is this true?
  - Graphs and the relationship between the graphs.

- **Short-Run Costs.**
  - **Definitions.**
    - What are production costs? Know the difference between explicit costs and implicit costs.
    - Total Cost = explicit costs + implicit costs.
    - Total Fixed Cost (TFC) = the cost of all inputs which are fixed in the short run => TFC does not vary as Q changes.
    - Total Variable Cost (TVC) = wage (w) * Labor (L) = wL.
    - Total Cost (TC) = TVC + TFC.
    - Marginal Cost = \( \frac{\Delta TC}{\Delta Q} = \frac{\Delta TVC}{\Delta Q} \). What does MC really stand for? The cost of producing the last unit.
    - Average Variable Cost (AVC) = TVC ÷ Q.
    - Average Fixed Cost (AFC) = TFC ÷ Q.
    - Average Total Cost (ATC or AC) = TC ÷ Q.
    - ATC = AVC + AFC.
  - Graphs You need to know what the graphs are and what the relationship between the various concepts are on the graphs.
    - What does TC, TVC, and TFC look like on a graph?
    - What does ATC, AVC, AFC, and MC look like on a graph?
    - What is the relationship between MC and TVC?
    - What is the relationship between AVC and TVC?
    - What is the relationship between MC and AVC? MC and ATC? ATC and AVC?
  - Relationship between production and costs.
    - if \( MP_L \) increases (or decreases) => what happens to MC, AVC, ATC, AFC? Why?
if APL increases (or decreases) => what happens to MC, AVC, ATC, AFC? Why?

- Long-Run Production
  - Definitions.
    - What is the long-run in production?
    - What is an isoquant?
    - What do isoquants look like graphically?
    - What is the marginal rate of technical substitution?
    - Why are isoquants downward sloping, convex?
  - Returns to Scale
    - What is scale?
    - Constant returns to scale
    - Increasing returns to scale
    - Decreasing returns to scale
    - How are all of these shown on a graph (isoquants)?
    - Why do we have returns to scale (do each in turn)?
  - Isocost Lines
    - Definition
    - What is the slope/intercepts of an Isocost line?
    - How does a given Isocost line change if relative input prices change or if total cost changes?
    - How many Isocost lines are there?
  - Profit maximization
    - What is the goal of the profit maximizing firm?
    - Show cost minimization graphically using Isocost and isoquant curves.
    - \( MP_L/w = MP_K/r \) – what does this equation mean?
    - What is the expansion path?
    - What happens if firms are not profit maximizers to the model?
    - What happens to cost curves as input prices change?

- Long-Run Costs
  - Definitions
    - LRAC, LMC, LTC – what are the cost curves and their properties?
    - How is long-run production related to long-run costs?
    - How is LRAC related to short-run cost curves?
    - Economies of scale
    - Diseconomies of scale
    - Constant returns to scale
    - Minimum efficient scale
- How are long-run costs related to Market Structure?
- Economies of Scope
  - What is scope?
  - Economies of Scope
  - Diseconomies of Scope