

AP Microeconomics — Unit 3

Production, Cost, and Perfect Competition

Must-Know Checklist for Unit Test 3

Profit Concepts

- Accounting profit = Total Revenue – Explicit costs only (ignores implicit/opportunity costs)
- Economic profit = Total Revenue – Explicit costs – Implicit costs
- Implicit costs include foregone wages, foregone interest on invested capital, and the opportunity cost of the owner's time
- Normal profit = zero economic profit (firm is covering all opportunity costs)

Short-Run Production

- Total Product (TP), Marginal Product ($MP = \Delta TP / \Delta L$), Average Product ($AP = TP / L$)
- $MP = 0$ when TP is at its maximum
- $MP = AP$ when AP is at its maximum (MP cuts AP from above)
- Law of diminishing marginal returns: MP eventually falls as more variable input is added to a fixed input
- TP increasing at a decreasing rate $\Rightarrow$ MP is positive but decreasing
- Diminishing returns begin where MC reaches its minimum (on a per-unit cost graph)

Costs — Definitions

- Fixed Cost (FC): does not change with output; exists only in the short run
- Variable Cost (VC): changes with output
- $TC = FC + VC$
- $AFC = FC / Q$ (always falls as Q rises)
- $AVC = VC / Q$
- $ATC = TC / Q = AFC + AVC$
- $MC = \Delta TC / \Delta Q = \Delta VC / \Delta Q$

Cost Curve Relationships (Memorize)

- Vertical distance between TC and VC = FC (constant as Q increases)
- Vertical distance between ATC and AVC = AFC (shrinks as Q increases)
- MC intersects both AVC and ATC at their minimum points
- When $MC < \text{average}$ $\rightarrow$ average is falling; when $MC > \text{average}$ $\rightarrow$ average is rising
- Example: if $MC (\$55) > ATC (\$40) > AVC (\$30)$, then AVC and ATC are both **rising**; AFC is always **falling**.

Long-Run Costs & Scale

- Economies of scale: LRATC falls as output rises (downward-sloping portion of LRATC)
- Diseconomies of scale: LRATC rises as output rises (upward-sloping portion)
- Constant returns to scale: LRATC flat
- Minimum Efficient Scale (MES): lowest output at which LRATC reaches its minimum
- Economies of scale $\rightarrow$ relationship between LRATC and firm size (long-run concept)
- Increasing returns to scale $\rightarrow$ relationship between inputs and output (also a long-run concept — different from economies of scale)

Perfect Competition — Firm Behavior

- Firm is a price taker; demand curve is horizontal at the market price ($D = MR = P = AR$)
- Profit-maximizing rule: produce where $MR = MC$ (on the rising portion of MC)
- A change in fixed cost does NOT change the profit-maximizing quantity in the short run (MC is unaffected)
- Changes in variable cost, productivity, or price DO change the profit-maximizing Q
- Marginal revenue of each unit = market price (since P is constant for a price taker)

Short-Run Shutdown Rule

- If $P \geq ATC \rightarrow$ produce; earn profit (or zero)
- If $AVC \leq P < ATC \rightarrow$ produce; minimize loss (covers variable costs + some fixed)
- If $P < AVC \rightarrow$ shut down; loss = fixed costs
- Firm's short-run supply curve = MC above the AVC minimum

Long-Run Equilibrium in Perfect Competition

- Positive economic profit $\rightarrow$ firms enter $\rightarrow$ market supply rises $\rightarrow$ price falls
- Economic losses $\rightarrow$ firms exit $\rightarrow$ market supply falls $\rightarrow$ price rises
- Long-run equilibrium: $P = MR = MC =$ minimum ATC; economic profit = 0
- Firms have no incentive to enter or exit when $P =$ minimum ATC
- Each firm produces at productive efficiency (min ATC) and allocative efficiency ($P = MC$)

FRQ Graph Must-Haves

- Axes labeled: Price/Cost on Y, Quantity on X
- All curves labeled: $D = MR = P$, MC, ATC, AVC
- MC crossing ATC and AVC at their minimum points
- Q^* identified where $MR = MC$
- Shade profit/loss rectangle if asked (between P and ATC at Q^*)
- Side-by-side market and firm graphs when asked to show both