I. REVIEW

A. CONSUMER THEORY

1. THE PROBLEM:
   a. CHOOSE A COLLECTION OF GOODS & SERVICES—QUANTITIES OF $X_1$, $X_2$, ... $X_N$ THAT MAXIMIZES UTILITY
   b. SUBJECT TO THE BUDGET CONSTRAINT:
      \[ B \geq P_1X_1 + P_2X_2 + \ldots + P_NX_N \]

2. THE SOLUTION:
   a. SPEND ENTIRE BUDGET (GET TO THE FRONTIER OF THE FEASIBLE BUNDLES)
      \[ B = P_1X_1 + P_2X_2 + \ldots + P_NX_N \]
   b. CHOOSE THAT COLLECTION ON THE FRONTIER THAT SATISFIES THE EQUIMARGINAL PRINCIPLE:
      \[ \frac{\text{MU}_1}{P_1} = \frac{\text{MU}_2}{P_2} = \ldots = \frac{\text{MU}_N}{P_N} \]

B. IMPLICATIONS:

1. DEMAND CURVES SLOPE DOWNWARD

2. IN EQUILIBRIUM, ALL CONSUMERS OBEY THE EQUIMARGINAL PRINCIPAL AND ALL FACE THE SAME RELATIVE PRICES, VALUE AT THE MARGIN, WILL BE THE SAME FOR ALL CUSTOMERS, E.G.,
   \[ \frac{P_X}{P_Y} = \frac{\text{MU}_X}{\text{MU}_Y} \]

E.G. SUPPOSE THAT $P_X = $6 AND $P_Y = $2. THEN $\text{MU}_X/\text{MU}_Y = 3$. I.E., IN EQUILIBRIUM, EACH CONSUMER CONSIDERS ONE MORE UNIT OF $X$ TO BE WORTH 3 MORE UNITS OF $Y$. THE $ value OF THOSE 3 $Y$ UNITS WOULD BE $6—EXACTLY WHAT $P_X$ SHOWS
II. PRODUCER BEHAVIOR

A. OBJECTIVE: PROFIT MAXIMIZATION, I.E., MAXIMIZE THE DIFFERENCE BETWEEN REVENUE AND COSTS, \( R(Q) - C(Q) \)

B. A PRODUCTION EXPERIMENT

C. REVENUE: PRICE TIMES QUANTITY = \( PQ \)

1. TOTAL REVENUE

2. MARGINAL REVENUE

D. COST CONCEPTS

1. TOTAL COST = \( TC(Q) \)

2. AVERAGE COST = \( \frac{TC(Q)}{Q} \)

3. MARGINAL COST = \( \frac{\Delta TC(Q)}{\Delta Q} = \frac{dTC}{dQ} \)

E. NECESSARY CONDITION FOR PROFIT MAXIMIZATION: MARGINAL REVENUE = MARGINAL COST

F. SUPPLY CURVE FOR THE COMPETITIVE INDUSTRY

1. \( P = MC \) FOR EACH FIRM

2. AT ANY GIVEN \( P \), DETERMINE \( Q \) THAT LEADS TO \( MC \) EQUAL TO THAT PRICE AT EACH FIRM

3. ADD OUTPUT OF EACH FIRM TOGETHER TO GET TOTAL INDUSTRY OUTPUT AT THAT PRICE

4. REPEAT FOR OTHER PRICE LEVELS
III. COMPETITIVE EQUILIBRIUM IN THE SHORT-AND LONG-RUN

A. PROFIT MAXIMIZATION AT COMPETITIVE FIRMS

1. FIRM DEMAND CURVE VS. INDUSTRY DEMAND CURVE

2. OPTIMAL PRODUCTION FOR A PROFIT-MAXIMIZING COMPETITIVE FIRM

B. COMPETITIVE FIRMS AND PROFIT MAXIMIZATION IN THE SHORT-RUN AND THE LONG-RUN

1. P = MC AS THE NECESSARY CONDITION

2. P = AC AS THE LONG-RUN EQUILIBRIUM (NO ENTRY) CONDITION

C. UNDERSTANDING THE COMPETITIVE OUTCOME

1. THE COMPETITIVE INDUSTRY SUPPLY CURVE AND MARGINAL COST CURVES

2. THE LONG-RUN COMPETITIVE INDUSTRY OUTCOME

   a. P = AC

   b. P = MC

   c. \( P_x = \frac{\text{MU}_x}{\text{MU}_y} \)
\[ FIRM_1: q_1(P^*) \\]
\[ FIRM_2: q_2(P^*) \\]
\[ INDUSTRY: q_1 + q_2 = Q(P^*) \\]
Possible Short-Run Equilibrium

Long-run Equilibrium