EXAMPLE: THREE MARKET STRUCTURES

$$D: p = 200 - \tfrac{1}{2} Q$$
$$MC = 20 + Q \quad \text{all firms are similar}$$

MONOPOLY $\longrightarrow$

$$MR_A = 200 - q_A$$

$$Q = q_A$$

DUOPOLY $\longrightarrow$

$$MR_A = 200 - q_A - \tfrac{1}{2} q_B$$
$$MR_B = 200 - q_B - \tfrac{1}{2} q_A$$

COMPETITIVE

$$S: p = 20 + \tfrac{1}{10} Q$$

MONOPOLY:

1. $\quad 20 + Q = 200 - q_A$
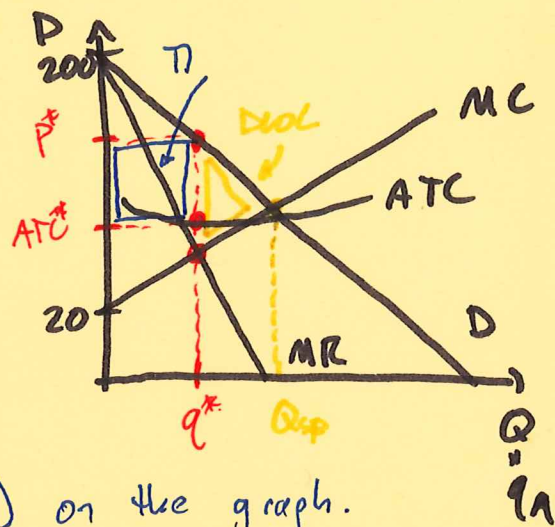$$2 q_A = 180$$
$$\boxed{q_A = 90} = q^*$$

2. $\quad P = 200 - \tfrac{1}{2} \cdot q^*$
$$= 200 - \tfrac{1}{2} \cdot 90$$
$$\boxed{P^* = 155}$$

3. ATC^* on the graph
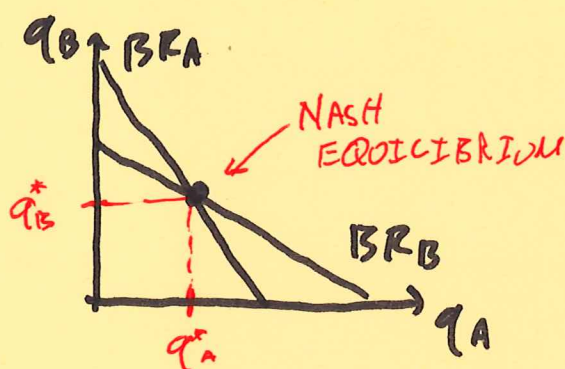

4. Profit (π) on the graph.

5. No entry, because its a monopoly.

FIRM'S PROBLEM

$$\max_q \Pi = TR - TC$$

1. $MC = MR \to q^*$
2. $q^* \to D \to P^*$
3. ~~add~~ $q^* \to ATC \to ATC^*$
4. $\Pi^* = (P^* - ATC^*) \cdot q^*$
5. If $\Pi^* \geq 0$ STAY/ENTER
   If $\Pi^* < 0$ EXIT

DUOPOLY: symetric $\to q_A^* = q_B^*$

$$Q = q_A + q_B$$

1. $MR_A = MC_A$

$$200 - q_A - \tfrac{1}{2}q_B = 20 + q_A$$

$$180 - \tfrac{1}{2}q_B = 2q_A$$

BR_A: $q_A = 90 - \tfrac{1}{4}q_B$

BR_B: $q_B = 90 - \tfrac{1}{4}q_A$ ← symetry

$$q_A^* = 90 - \tfrac{1}{4}q_A^*$$

$$\tfrac{5}{4}q_A^* = 90$$

$$\boxed{\begin{array}{l} q_A^* = 90 \cdot \tfrac{4}{5} = 72 \\ q_B^* = 72 \end{array}}$$

$$Q = 144$$

2. $P = 200 - \tfrac{1}{2} \cdot (72 + 72)$
   $= 200 - \tfrac{1}{2} \cdot (144)$
   $P^* = 200 - 72 = \boxed{128 = P^*}$

q_B BR_A — NASH EQUILIBRIUM — q_B^*, q_A^*, BR_B, q_A

COMPETITIVE:

0. $200 - \tfrac{1}{2}Q = 20 + \tfrac{1}{10}Q$

$$180 = \left(\tfrac{1}{2} + \tfrac{1}{10}\right)Q = \left(\tfrac{10}{20} + \tfrac{2}{20}\right)Q$$

$$180 = \tfrac{12}{20}Q = \tfrac{3}{5}Q$$

$$\boxed{Q^* = 180 \cdot \tfrac{5}{3} = 300}$$

$$\boxed{P^* = 20 + 30 = 50} = MR$$

1. $20 + q = 50$
   $\boxed{q^* = 30}$

2. $\boxed{P^* = 50}$

FIRM: P, MC, ATC, MR P^*, 20, q^*, q

MARKET: P, S, P^*, D, Q^*, Q

3. On the graph.

4. $\Pi = 0$. Long run equilibrium.

5. No entry or exit.