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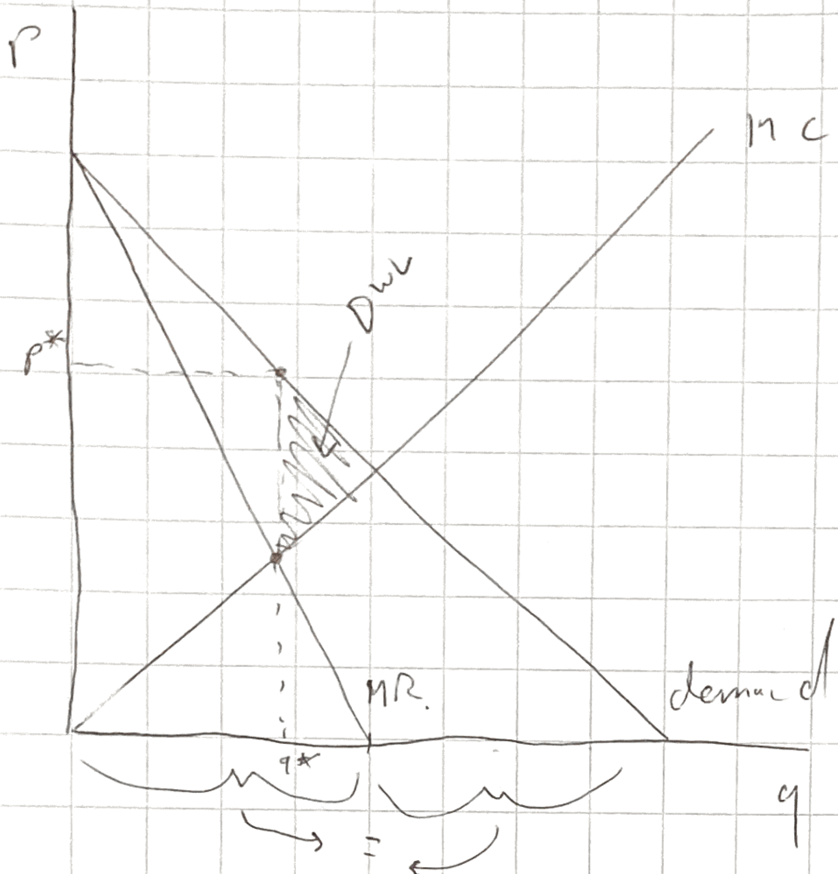

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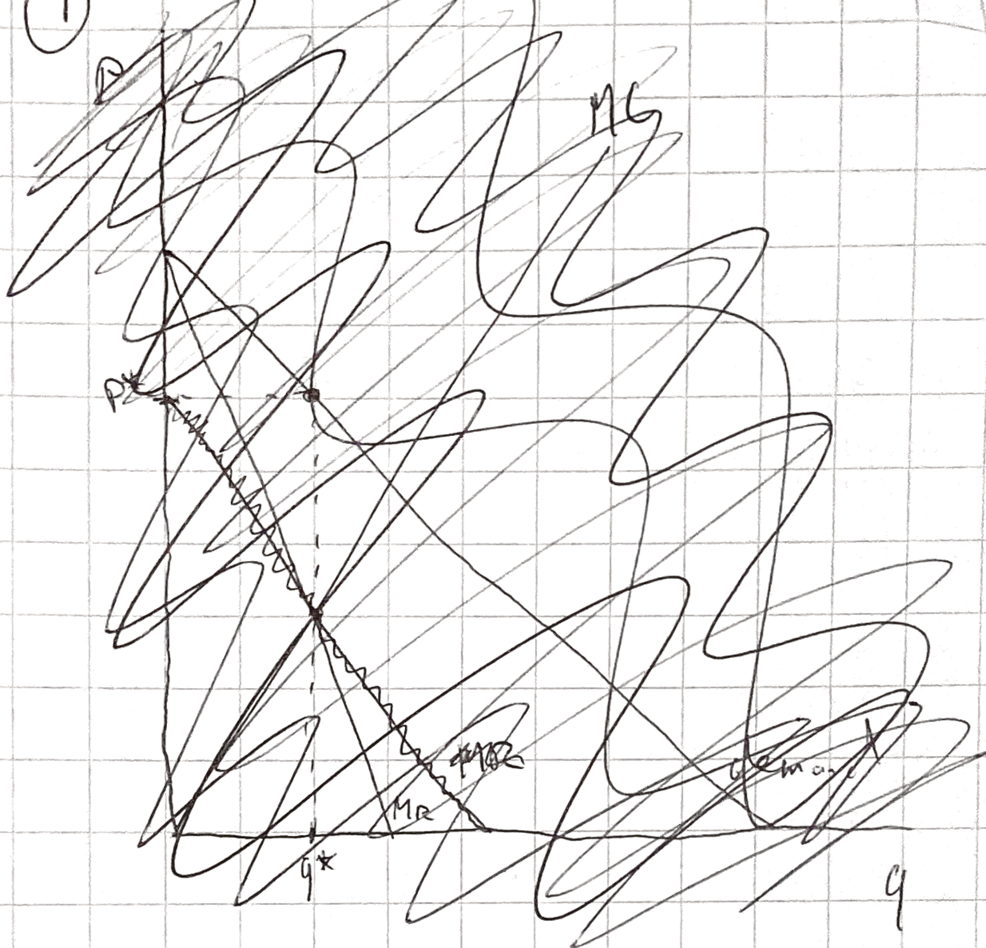

a. $R(q) = P(q)\,q$

so

$MR(q) = P(q)\cdot\frac{dq}{dq} + \frac{dP(q)}{dq}\,q = P(q) + \frac{dP(q)}{dq}\,q$

this is just the demand curve therefore, Because the demand curve is downward sloping (unless there is perfect competition) Because of th Law of Demand, $\frac{dP(q)}{dq}\,q < 0$. therefore, at any given q, MR is going to be $\frac{dP(q)}{dq}\,q$ less than the demand function, therefore, it lies below the demand function. this also makes sense, if the firm increases its output with 1, it gains revenue from that unit (the $P(q)$ term in MR) but ~~redu~~ because it has to lower its price, it loses the difference in price (the $\frac{dP(q)}{dq} q$ term) on all units sold

✓

B. $\varepsilon = \frac{dq}{dP} \frac{P}{q}$

so because $MR = P + \frac{dP}{dq} q$

$$= P + P \cdot \frac{dP}{dq} \frac{q}{P}$$

$$= P + P \frac{1}{\frac{dq}{dP} \frac{P}{q}}$$

$$= P \left(1 + \frac{1}{\varepsilon}\right)$$ ✓

Because when the firm is optimizing

✓

$$MC = MR$$

$$MC = P\left(1 + \frac{1}{\varepsilon}\right)$$

$$\frac{P}{MC} = \frac{1}{1 + 1/\varepsilon}$$

$$P = \frac{MC}{1 + 1/\varepsilon}$$ ✓

Comment. In words what does this mean about the relationship between P and ε?

c. No, there is no free entry and exit (it is a monopoly) so profits do not have to be 0. Therefore, Because P = AC does not have to be there, production does not have to be at the minimum average cost.

d. Because a monopoly would set a price higher than its MC, consumers buy less of the good than in a competitive market, leading to a DWL. ~~therefore the DWL b/c the triangle between the monopolies~~ ~~[illegible]~~ See graph.

But what is it?
It is the surplus lost on the forgone units
i.e. $\sum_{\text{all units not traded}} (WTP - WTA)$

(3) a. ~~$R_1 = P(y)\,y_1 = P(y_1 + y_2)\,y_1$~~

~~$= (72 - 3y_1 - 3y_2)\,y_1$~~

~~$= 72y_1 - 3y_1^2 - 3y_2 y_1$~~

$$MR_1 = P(y) + P'(y)\,y_1 = 72 - 3y_1 - 3y_2 - 3y_1$$

$$= 72 - 6y_1 - 3y_2$$

Would prefer for you to write the profit function and explicitly maximize.... it would explain why MR=MC at the optimum ...

Firm 1 is trying to optimize, so:

$$MR_1 = MC_1$$

$$72 - 6y_1 - 3y_2 = 12$$

$$y_1 = 10 - \frac{1}{2} y_2$$

Because Firm 2 has the same MC,

$$y_2 = 10 - \frac{1}{2} y_1$$

So, outputs will be:

$$y_2 = 10 - \frac{1}{2}\left(10 - \frac{1}{2} y_2\right)$$

$$y_2 = 10 - 5 + \frac{1}{4} y_2$$

$$\frac{3}{4} y_2 = 5$$

$$y_2 = \frac{20}{3}$$

- Because the firms are equal $y_1 = y_2 = \frac{20}{3}$
- $P = 72 - 3 \cdot \left(\frac{20}{3} + \frac{20}{3}\right) = 72 - 40 = 32$
- $y = y_1 + y_2 = \frac{40}{3}$
- $\pi_1 = \pi_2 = 32 \cdot \frac{20}{3} - 12 \cdot \frac{20}{3} = 20 \cdot \frac{20}{3} = \frac{400}{3}$
- $\Pi = \pi_1 + \pi_2 = \frac{800}{3}$

B. $$\frac{P - MC_i}{P} = \frac{S_i}{|\varepsilon|}$$

Because $S_i = \frac{1}{2}$ for every firm here

(they are identical)

and $$\varepsilon = \frac{dq}{dp} \frac{P}{q}$$

$$\cancel{\frac{dq}{dp}} = \quad q = 24 - \frac{1}{3}p$$

$$\frac{dq}{dp} = -\frac{1}{3}$$

$$\varepsilon = -\frac{1}{3} \cdot \frac{32}{40/3} = -\frac{4}{5}$$

so $$\frac{S_i}{|\varepsilon|} = \frac{5}{8}$$

and $$\frac{P - M_{c_i}}{P} = \frac{32 - 12}{32} = \frac{5}{8}$$

C. $$HHI = \sum_{i=1}^{i=N} S_i^2 = \left(\frac{1}{2}\right)^2 + \left(\frac{1}{2}\right)^2 = \frac{1}{2}$$

d.

$$MR_1 = 72 - 6y_1 - 3y_2$$

$$MR_1 = MC_1 \Leftrightarrow$$

$$72 - 6y_1 - 3y_2 = 6$$

$$-6y_1 - 3y_2 = -66$$

$$y_1 + \frac{1}{2}y_2 = 11$$

$$y_1 = 11 - \frac{1}{2}y_2$$

and For Firm 2 it stays the same:

$$y_2 = 10 - \frac{1}{2}y_1$$

So:

$$y_1 = 11 - \frac{1}{2}\left(10 - \frac{1}{2}y_1\right)$$

$$y_1 = \cancel{16}\ 11 - 5 + \frac{1}{4}y_1$$

$$\frac{3}{4}y_1 = 6$$

$$y_1 = 8$$

and

$$y_2 = 10 - \frac{1}{2} \cdot 8 = 6$$

- $y_1 = 8$; $y_2 = 6$; $y = \cancel{16}\ 14 > 40/3$ so more production
- $p = 72 - 3 \cdot 14 = 30 < 32$
- $\pi_1 = 8 \cdot 30 - 6 \cdot 8 = 192$; $\pi_2 = 6 \cdot 30 - 12 \cdot 6 = 108$; $\Pi = 300 > 800/3$

$$\cancel{\frac{HHI}{|\varepsilon|} = \sum_{i=1}^{i=N} s_i \frac{p - mc_i}{p} = }$$

$$s_i = \frac{p - mc_i}{p} \cdot |\varepsilon|$$

$$S_1 = \frac{30 - 6}{30} \cdot |\varepsilon| = \frac{4}{5} |\varepsilon|$$

$$S_2 = \frac{30 - 12}{30} \cdot |\varepsilon| = \frac{3}{5} |\varepsilon|$$

and

$$\varepsilon = -\frac{1}{3} \cdot \frac{30}{14} = -\frac{5}{7}$$

so $S_1 = \frac{4}{5} \cdot \frac{5}{7} = \frac{4}{7}$

and $S_2 = \frac{3}{5} \cdot \frac{5}{7} = \frac{3}{7}$

so $HHI = \sum_{i=1}^{i=N} s_i^2 = \left(\frac{4}{7}\right)^2 + \left(\frac{3}{7}\right)^2 = \frac{25}{49}$

$\frac{25}{49} > \frac{1}{2}$ so it is more monopolistic