

ECON 204

Quiz 9: Market Power.

Kevin Hasker

1. (2 Points)¹ Please read and sign the following statement:

I promise that my answers to this test are based on my own work without reference to any notes, books, calculators or other electronic devices. I further promise to neither help other students nor accept help from them.

Name and Surname: _____
 Student ID: _____
 Signature: _____

a	b	χ	FOC	Q^m	P^m	Q^e	Π^m	CS	DWL
21	2	5	$16 - 4Q$	4	13	8	32	16	16
22	2	2	$20 - 4Q$	5	12	10	50	25	25
21	1	9	$12 - 2Q$	6	15	12	36	18	18
19	$\frac{1}{2}$	11	$8 - Q$	8	15	16	32	16	16

2. (15 points total) Consider a market where the inverse demand curve is $P = a - bQ$ and the costs of the monopolist who serves this market are $c(Q) = \chi Q$.

- (a) (1 point) Set up the Monopolist's profit function, it should be a function of Q .

$$\Pi(Q) = (a - bQ)Q - \chi Q$$

- (b) (6 points) Find the first order condition of the Monopolist's objective function, find the optimal amount of output for them to supply and the price they will charge consumers.

Solution 1 The first order condition is:

$$(a - bQ) - bQ - \chi = 0$$

thus the optimal quantity is $Q^m = \frac{1}{2b}(a - \chi)$ and the price should be set to clear the market

$$\begin{aligned} P^m &= a - bQ^m \\ &= a - b\left(\frac{1}{2b}(a - \chi)\right) \\ &= \frac{1}{2}a + \frac{1}{2}\chi \end{aligned}$$

- (c) (2 points) Find the efficient quantity in this market and explain why it is efficient.

¹On the quiz I wrote 6, but just use 2 to make the total 20 at most.

Solution 2 In order to find the efficient quantity we should set the price equal to marginal cost, if $P = \chi$ then:

$$\begin{aligned} P^e &= \chi = a - bQ \\ Q^e &= \frac{a - \chi}{b} \end{aligned}$$

- (d) (6 points) In this market find the profits of the monopolist, the consumer surplus, and the deadweight loss.

Solution 3 First the profits:

$$\begin{aligned} \Pi &= (P - \chi)Q = \left(\frac{1}{2}a + \frac{1}{2}\chi - \chi\right) \frac{1}{2b}(a - \chi) \\ &= \frac{1}{4b}(a - \chi)^2 \end{aligned}$$

Now $CS = \frac{1}{2}bh$, where the base is $Q^m = \frac{1}{2b}(a - \chi)$ and $h = a - P^m$ or the vertical intercept of demand minus the price. Thus this is

$$\begin{aligned} CS &= \frac{1}{2} \frac{1}{2b}(a - \chi) \left(a - \left(\frac{1}{2}a + \frac{1}{2}\chi\right)\right) \\ &= \frac{1}{8b}(a - \chi)^2 \end{aligned}$$

Like consumer surplus, deadweight loss is a triangle, $DWL = \frac{1}{2}bh$, now $b = Q^e - Q^m = \frac{a - \chi}{b} - \frac{1}{2b}(a - \chi) = \frac{1}{2b}(a - \chi)$ and $h = P^m - P^e = \frac{1}{2}a + \frac{1}{2}\chi - \chi = \frac{1}{2}a - \frac{1}{2}\chi$ thus

$$DWL = \frac{1}{2} \frac{1}{2b}(a - \chi) \left(\frac{1}{2}a - \frac{1}{2}\chi\right) = \frac{1}{8b}(a - \chi)^2$$

3. (3 points) Assume that a firm has the cost function $c(q) = cq + F$. Explain how we know that either this firm must have market power or will shut down.

Solution 4 If this firm was competitive, then $p = mc = c$ and their profits would be:

$$pq - cq - F = cq - cq - F = -F < 0$$

so this firm must price above marginal cost to survive, and thus must have some market power.