

Exam Three Answers
 Microeconomics
 Professor Lemke
 Fall 2005

The test is out of 100 points.

1. (18 points) For each of the eight characteristics of industry structures given below, list whether it is associated with Perfect Competition, Monopoly, and/or Monopolistic Competition. Write Y if the characteristic is associated with the industry structure. Write N if the characteristic is not associated with the industry structure. Fill in all 24 boxes. Each characteristic can be associated with zero, one, two, or three industry structures.

	Perfect Competition	Monopoly	Monopolistic Competition
Profits are zero in the long run.	Y	N	Y
The industry is consumer efficient in the long run.	Y	N	N
The industry is consumer efficient in the short run.	Y	N	N
Supply curves are essentially marginal cost curves.	Y	Y	Y
Entry into the industry is prohibited in the short run.	Y	Y	Y
Entry into the industry is prohibited in the long run.	N	Y	N
Each firm faces a downward sloped demand curve.	N	Y	Y
A firm might find it profitable to advertise its product.	N	Y	Y

2. (8 points) What is the difference between regulation and anti-trust?

A government engages in regulation when it controls the price a monopoly can charge. A government engages in anti-trust behavior when it breaks-up a monopoly into two or more smaller firms.

3. (4 points) What do economists mean by the word “externality”?

An externality is a cost or benefit that is associated with the production or consumption of a good that is not paid for or received by the producer or consumer of the good. For example, pollution generated by the manufacturing of cars is an externality because people (society) bear the cost of pollution when they breathe polluted air even though they did not directly benefit from the production or consumption of cars.

4. (20 points) A monopolist faces an industry demand curve of $q = 1200 - 5p$. The monopolist faces total costs according to $C(q) = 500 + 40q + 1.8q^2$ so that its marginal cost curve is $MC(q) = 40 + 3.6q$. How much output should the monopolist make to maximize its profit? At what price will it sell each unit of output? How much profit will the monopolist earn?

Given the demand function, the inverse demand curve is $p = 240 - 0.2q$. Thus, the firm's marginal revenue curve is $MR = 240 - 0.4q$. We can now employ our standard four-step process.

Step 1: Choose q^* such that $MR = MC$.

$$\begin{aligned}240 - 0.4q &= 40 + 3.6q \\4q &= 200 \\q^* &= 50 \text{ units.}\end{aligned}$$

Step 2: Use q^* to find p^* .

$$p^* = 240 - 0.2q^* = 240 - 0.2(50) = \$230.$$

Step 3: Use q^* and p^* to calculate profit.

$$\begin{aligned}R(q^*) &= q^* \times p^* = 50 \times \$230 = \$11,500. \\C(q^*) &= 500 + 40(50) + 1.8(50)^2 = \$7,000. \\\pi(q^*) &= R(q^*) - C(q^*) = 11,500 - 7,000 = \$4,500.\end{aligned}$$

Step 4: Check the shut-down and exit rules.

As profit is greater than zero, this firm should not shut-down in the short-run or exit in the long run.

5. (30 points) The daily global market for oil is described by $p = 160 - 0.25Q$ where Q is total industry output (in millions of barrels) and p is the price of each barrel. The marginal cost of producing a barrel of oil is \$10 in all countries. Suppose all oil producing countries are members of OPEC. OPEC decides to limit production to 300 million barrels per day, which maximizes joint profits for OPEC. Under this limitation, OPEC agrees that Mexico will produce 5 million barrels each day.

- A. What is Mexico's daily variable profit from oil if it and all OPEC countries abide by the agreement?

Under the agreement, total daily production is 300 million barrels, so the price of each barrel of oil is $p = 160 - 0.25(300) = \$85$.

Given the price, Mexico's daily profit is straightforward to calculate:

$$\pi_{\text{Mex}} = (p - c) \cdot q_{\text{Mex}} = (\$85 - \$10) \cdot 5 \text{ million} = \$375 \text{ million.}$$

- B. Show that Mexico could increase its daily profit by cheating on the agreement.

Suppose Mexico cheats on the agreement by producing 6 million barrels each day. Total production would then be 301 million barrels each day. In this case, the price of each barrel is $p = 160 - 0.25(301) = \$84.75$. Given this new price and quantity, Mexico's daily profit is now:

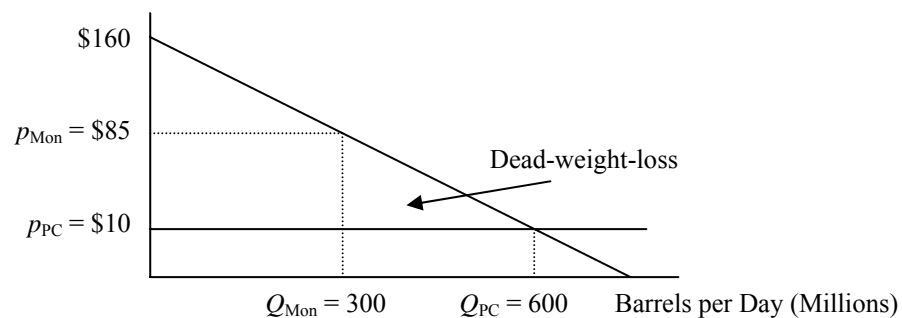
$$\pi_{\text{Mex}} = (p - c) \cdot q_{\text{Mex}} = (\$84.75 - \$10) \cdot 6 \text{ million} = \$448.5 \text{ million.}$$

Thus, Mexico's profit has increased from \$375 million to \$448.5 million.

- C. Suppose OPEC is successful in limiting daily supply to 300 million barrels. How much dead-weight-loss arises because of this policy in comparison to the perfectly competitive market that would exist in the absence of OPEC?

First, we know that under perfect competition, price equals marginal cost. Therefore, under perfect competition, price would equal \$10 per barrel and 600 million barrels of oil would be produced each day. (To derive the 600 million number, solve $10 = 160 - 0.25q$.)

Now, to calculate the dead-weight-loss that arises from OPEC's policy, a graph is useful.



Thus, dead-weight-loss = $(\frac{1}{2}) \cdot (\$85 - \$10) \cdot (\$600\text{m} - \$300\text{m}) = \$11,250$.

6. (20 points) Consider an industry with market demand and supply curves of

$$Q_D = 220 - 2p \quad \text{and} \quad Q_S = 3p - 180.$$

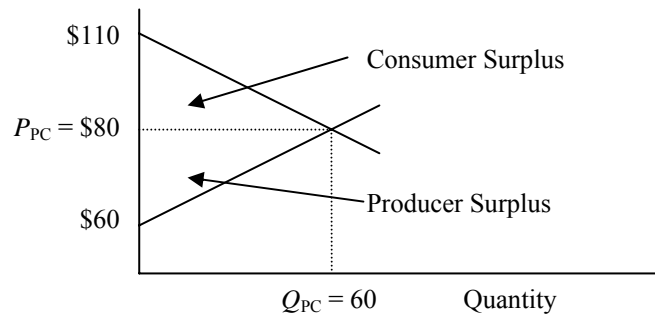
- A. How much consumer surplus and producer surplus is received under a competitive market? (Hint: a competitive market will result in 60 units being sold at a price of \$80 each.)

First, the inverse demand and supply curves will be useful.

$$\text{Inverse Demand: } p = 110 - 0.5Q_D.$$

$$\text{Inverse Supply: } p = 60 + (\frac{1}{3})Q_S.$$

The hint gives us the competitive solution: $p = \$80$ and $Q = 60$. A graph might now help.



So now:

$$\text{Consumer Surplus} = (\frac{1}{2}) \cdot (\$110 - \$80) \cdot 60 = \$900.$$

$$\text{Producer Surplus} = (\frac{1}{2}) \cdot (\$80 - \$60) \cdot 60 = \$600.$$

- B. Suppose the government imposes a per-unit tax of \$20 on producers for each unit of the good that is sold. What is consumer surplus and producer surplus under the tax? How much tax revenue does the tax generate? How much dead-weight-loss arises because of the tax?

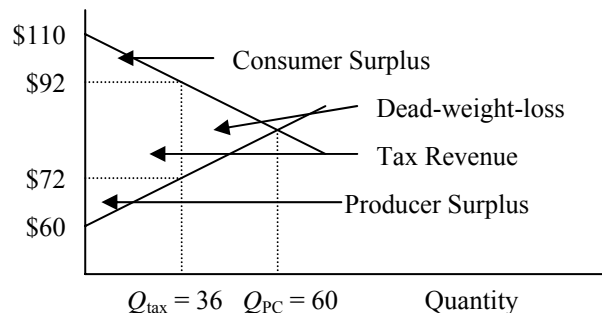
First, we must solve for the new equilibrium. This is easiest by changing the inverse supply curve. As firms must pay \$20 for each unit sold, the new inverse supply equation is $p - 20 = 60 + (\frac{1}{3})Q_S$ so that $p = 80 + (\frac{1}{3})Q_S$. Solving for the tax equilibrium using the original inverse demand equation and new inverse supply equation we have:

$$110 - 0.5Q_D = 80 + (\frac{1}{3})Q_S.$$

$$(\frac{5}{6})Q = 30$$

$$Q_{\text{tax}} = 36 \text{ units}$$

Thus: $p_{\text{tax}} = 110 - 0.5(36) = \92 , and firm's receive $\$92 - \$20 = \$72$ per unit. Graphically:



Now for the calculations:

$$\text{Consumer Surplus} = (\frac{1}{2}) \cdot (\$110 - \$92) \cdot 36 = \$324.$$

$$\text{Producer Surplus} = (\frac{1}{2}) \cdot (\$72 - \$60) \cdot 36 = \$216.$$

$$\text{Tax Revenue} = \text{tax} \cdot \text{quantity} = \$20 \cdot 36 = \$720.$$

$$\text{Dead-weight-loss} = (\frac{1}{2}) \cdot (\$92 - \$72) \cdot (60 - 36) = \$240.$$