

Econ 200A  
Midterm 2  
March 11, 2021

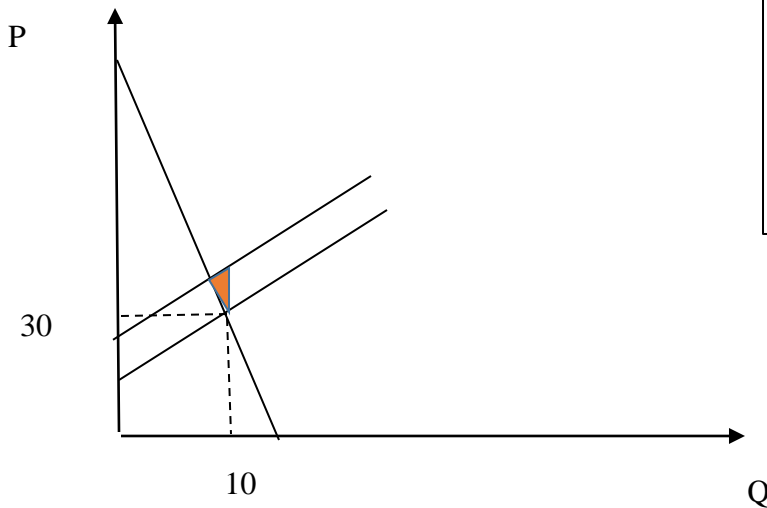
95 points total. 4 questions. 80 minutes maximum. Reminder: While this is an open note test, you are not allowed to consult materials that are not the book, MH Connect, or your notes. **Please write legibly and show your work on every problem. Use two decimal places of precision when necessary.**

Please read this statement from the Department of Economics:

*Academic integrity is the cornerstone of the Department's rules for student conduct and evaluation of student learning. Students accused of academic misconduct will be referred directly to the Office of Community Standards and Student Conduct for disciplinary action pursuant to the Student Conduct Code and, if found guilty, will be subject to sanctions. Sanctions range from a disciplinary warning, to academic probation, to immediate dismissal for the Department and the University, depending on the seriousness of the misconduct. Dismissal can be, and has been, applied even for first offenses. Moreover, a grade of zero can be assigned by the instructor for the course.*

1. (24 points) Consider the market for pineapples in a small island nation. The demand curve (in dollars) is  $P = 60 - 3Q_D$  and the supply curve is  $P = 10 + 2Q_S$ .  $Q$  is in millions of pounds of pineapples per year.

- a. (8 points) Calculate the equilibrium price and quantity in the market for pineapples. Graph the curves and equilibrium price and quantity.



Graph, 4 points  
2 point for drawing axes and labeling  
1 point for curves  
1 points for equilibrium

Supply=Demand  
 $10 + 2Q = 60 - 3Q$  (2 points)  
 $5Q = 50$   
 $Q = 10$  million pounds (1 point)  
 $P = 10 + 2 \cdot 10 = \$30$  (1 point)

- b. (5 points) Suppose that the government realizes that the harvesting of pineapples is contributing to deforestation and pollution and that the extra costs associated with these harms amounts to \$10 per pineapple per year in lost income in the island's tourism industry. With this externality, the Marginal Social Cost in the pineapple market is  $MSC = 20 + 2Q$ . Calculate the socially optimal quantity and price of pineapple with this externality and draw the Marginal Social Cost on your graph.

$MSC = MB$  (or Demand)  
 $20 + 2Q = 60 - 3Q$  (2 points)  
 $5Q = 40$   
 $Q = 8$  million pounds (1 point)  
 $P = \$36$  (1 point)

MSC on graph above – 1 point

- c. (6 points) What is the deadweight loss in part a if the government allows the pineapple market to operate without intervention? Show this on the graph.

Graph of DWL (3 points – 2 for having in correct spot)

DWL =  $\frac{1}{2} (10 - 8) (\$10) = \$10$  million (3 points – 2 for formula, 1 for answer)

- d. (5 points) Why might an economist find that the socially optimal level of pollution is greater than zero, even though we all know that pollution is bad? Use an economic argument here to explain why.

A full credit answer contains some version of the following three ideas:

- Pollution is tied to production of a “good” or something that has positive value.
- Although pollution carries a cost (or can be viewed as the external cost in the externality), that cost is finite.
- These facts suggest that the intersection of MSC and MB happens at  $Q > 0$

Give three points for 2 of the 3.

Give two points for 1.

2. (23 points) The production function for William's widgets is given in the table below. William's is a representative firm in a perfectly competitive industry and he faces labor costs (or wages) of \$100/worker/day and fixed costs of \$500/day.

L (workers/day)	Q (widgets/day)	MC (\$/widget)	AVC (\$/widget)	ATC (\$/widget)
0	0	X	X	X
1	10	<b>10</b>	<b>10</b>	<b>60</b>
2	50	<b>2.5</b>	<b>4</b>	<b>14</b>
3	110	<b>1.67</b>	<b>2.72</b>	<b>7.27</b>
4	160	<b>2</b>	<b>2.5</b>	<b>5.63</b>
5	200	<b>2.5</b>	<b>2.5</b>	<b>5</b>
6	230	<b>3.33</b>	<b>2.61</b>	<b>4.78</b>
7	255	<b>4</b>	<b>2.75</b>	<b>4.71</b>
8	275	<b>5</b>	<b>2.91</b>	<b>4.73</b>

- a. (8 points) Fill in the blanks in the table above (you can either fill in this table and send a picture of it separately or reproduce it on your own paper. For part a, you do not need to show your work, but you should round your answers to two decimals.

Each cell is 1/3 point.

- b. (5 points) What is the firm's output and profit when the market price of widgets is \$5?  
List the rule you use when determining this answer.

$P=MC$  (1 point)

This occurs at  $Q=275$  (1 point)

Profit =  $(P-AC)Q=(5-4.75)*275 = 74.25$  (3 points – 2 for formula applied correctly, 1 for answer)

- c. (5 points) What is the firm's shut down price? What is the long run equilibrium price in this market if all firms are like William's? List the decision rules you used to find these points.

$P_{\text{shutdown}} = \min AVC = 2.5$  (2.5 points – 2 for formula,  $\frac{1}{2}$  for answer)

$PLR = \min ATC = 4.71$  (2.5 points – 2 for formula,  $\frac{1}{2}$  for answer)

- d. (5 points) How many firms like William's would you expect to find in the market if the market were in long run equilibrium and with market demand  $Q = 4,905 - 500P$ ?

From above:  $PLR = 4.71$

$Q_{\text{firm}} = 255$  (1 point)

$Q_{\text{mkt}} = 4905 - 500(4.71) = 4905 - 2355 = 2550$  (2 points – 1 for formula, 1 for answer)

$N = Q_{\text{mkt}} / Q_{\text{firm}} = 2550 / 255 = 10$  (2 points – 1 for formula, 1 for answer)

3. (20 points) Answer the following questions about costs
- a. (5 points) What does the long run average total cost curve describe?

Full credit answers contain all three in some form:

-Curve of average costs

-Per level of output/Q

-Calculated with all inputs varying (I don't think it's enough to say "in the long run" here).

3 points for 2 of the 3.

2 points for 1 of the 3.

- b. (5 points) What term describes the situation where long run average cost does not depend on output?

Constant returns to scale (5 points)

Partial credit for economies of scale or diseconomies of scale (1 point)

- c. (10 points) A bracelet making company has three employees and together they produce 10 bracelets per hour. When the fourth worker joins them, the output is now 11 bracelets per hour. Answer the following about the firm's production function at this level of output. You may use a graph as part of your explanation, but it cannot be your whole explanation.

- i. (5 points) Is the marginal product of labor diminishing between 3 and 4 workers? Explain your choice.

Yes (1 point)

$APL(Q=3)=3.33$  &  $APL(Q=4)=2.75$  (2 points)

And MPL is less than APL if APL is falling due to the relationship between these two quantities (a few ways to describe this) (2 points)

Partial credit:

- Just yes or yes and graph without anything else, 1 point
- Yes and graph with decreasing part of APL marked in some way, but no other explanation, 2 pts
- Yes and graph with  $APL(3)$  and APL (marked), 3 points

Note: Not sufficient to just have graph and graph not required, but graph can be used to help explain concepts.

- ii. (5 points) Is the marginal product of labor (MPL) greater than, less than, or equal to the average product of labor (APL) when the firm has 4 workers? Explain your choice.

$MPL < APL$ . This is because APL is falling and we know that APL only falls when MPL is below it because of the relationship between these two variables.

Partial credit according to the rules above.

4. (28 points) A monopolist seller of a prescription drug faces demand  $P=2000-2Q$ . This means that their marginal revenue is  $MR=2000-4Q$ . They face costs  $ATC=MC=0$ . You may want to draw a graph to help you answer the following, but it is not required. Include your graph with your answers if you want it to be considered in grading.

- a. (10 points) Find  $Q_m$ ,  $P_m$ , and profit for this firm.

$$MR=MC \text{ (1 point)}$$

$$2000-4Q=0 \text{ (1 point)}$$

$$Q=500 \text{ (1 point)}$$

$$P=2000-2q \text{ (2 points)}$$

$$P=1000 \text{ (1 point)}$$

$$\text{Profit} = (P-AC)Q \text{ (2 points) or } TR-TC \text{ (2 points)}$$

$$\text{Profit} = \$1000 * 500 = \$500,000 \text{ (2 points)}$$

- b. (8 points) Find the efficient output and price in this market.

$$P=MC \text{ (2 points)}$$

$$2000-2Q=0 \text{ (2 points)}$$

$$2Q=2000$$

$$Q=1000 \text{ (2 points)}$$

$$P=0 \text{ (2 points)}$$



- c. (5 points) What is the deadweight loss due to the monopoly?

$$DWL = \frac{1}{2} (\$1000)(1000 - 500) \text{ (2 points)} = \$250,000 \text{ (3 points)}$$

- d. (5 points) Explain why monopolies cannot be productively efficient. You may want to use a graph here as part of your answer.

For full credit, answers should contain all three of the points below:

- Monopoly MR curve is downward sloping (slope < 0)
- Productive efficiency means producing where ATC is minimized and this only happens where the slope = 0 (or at the bottom of the curve).
- MR can't intersect MC at Q where ATC is minimized, because of the first two points.

Partial credit:

Three points for 2 of 3.

Two points for 1 of 3.