

Economics 3550  
Intermediate Microeconomics  
Professor Rous  
Mid-Term Exam 2: ANSWER KEY  
April 7, 2003

Name \_\_\_\_\_ **KEY** \_\_\_\_\_

Clearly label all graphs for full credit and please write legibly; I cannot grade what I cannot read.

Number of points each question is worth in parentheses.

1. (8) Demand for Nokia 6250 cellular phones is:  $P = 200 - .005Q$ . If the current price is \$120, what is the demand elasticity for these phones?  
In order to raise revenue from phone sales, should Nokia change the price of their phones? If so, should they raise or lower prices? Explain how you know.

$$E = (1/.005) * (120/16000) = 1.5$$

*If elasticity is 1.5, then demand is elastic.*

*This means that if price falls, the increased sales will increase revenue more than the lower price will cause revenue to fall. Overall, a lower price will cause revenue to rise.*

2. (7) Demand for normal goods is typically more (elastic) / inelastic than inferior goods.  
(circle one)

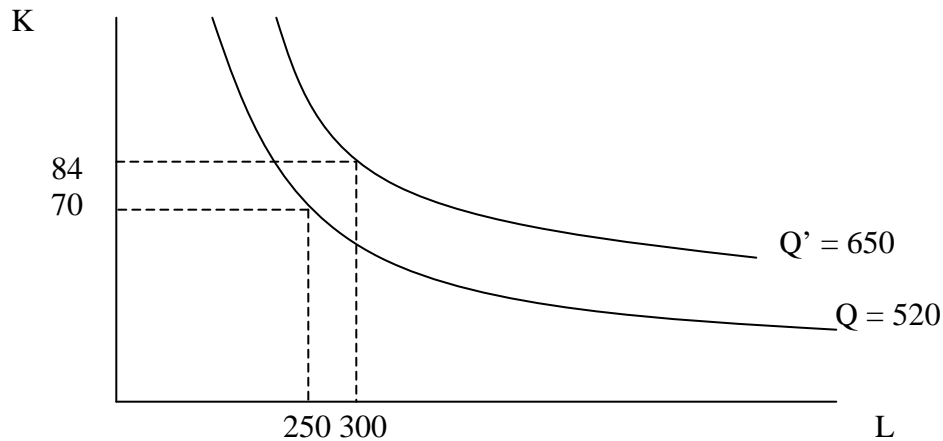
Explain why that is.

*For normal goods, when price rises, both the substitution and income effect work to lower the quantity demanded. For inferior goods, the substitution effect works to lower the quantity demanded but the income effect works the opposite direction as the substitution effect. Therefore, demand tends to be more elastic for normal goods.*

*Note: Goods that take up a large portion of your budget tend to be normal. However, the opposite is not necessarily true. Normal goods do not necessarily take up a large portion of your budget.*

3. (7) As production increases from 520 to 650 for the firm whose production is illustrated below, does production exhibit
- Increasing Marginal Returns
  - Diminishing Marginal Returns
  - Increasing Returns to Scale**
  - Decreasing Returns to scale.

**Explain how you know which one it is.**



*There is a 20% increase in K and L leading to a 25% increase in output. Since both K and L are changing it must be either C or D (increasing and diminishing marginal returns are short run phenomena caused by one input being fixed).*

*Since the % change in each output is > the % change in inputs, the returns to scale must be increasing.*

4. (6) The city of Dallas is contemplating a new liquor tax. Two options are being considered. Option A would levy a percentage tax on sales of alcohol (so there would be an excise tax on each bottle sold which would only vary by the value of the bottle). Option B would increase the annual liquor license fee. Both options are expected to generate the same amount of tax revenue.

Which one would probably have less of an impact on firm behavior in the short run ( I only say “short run” because later in the semester we will learn that the answer may differ in the long run).

*Option A would affect variable cost and Option B would affect fixed cost. Since firm behavior depends on setting  $MR = MC$ , and only changes in variable cost can affect marginal cost, only Option A would affect firm behavior.*

5. Assume the Big Swing Baseball Company has the following daily short run production function when  $K = 324$ :

$$Q = 4(K)^{.5}*(L)^{.5}$$

- a. (4) What is the firm’s marginal product of labor function?

$$MPL = 36/(L)^{.5}$$

Assuming the wage rate is \$100 per day and the rental rate paid to capital is \$600:

- b. (4) What is the firm’s average total cost function (as a function only of Quantity)?

$$Q^2 = 1296L$$

$$L = Q^2/1296$$

$$VC = 100 * Q^2/1296$$

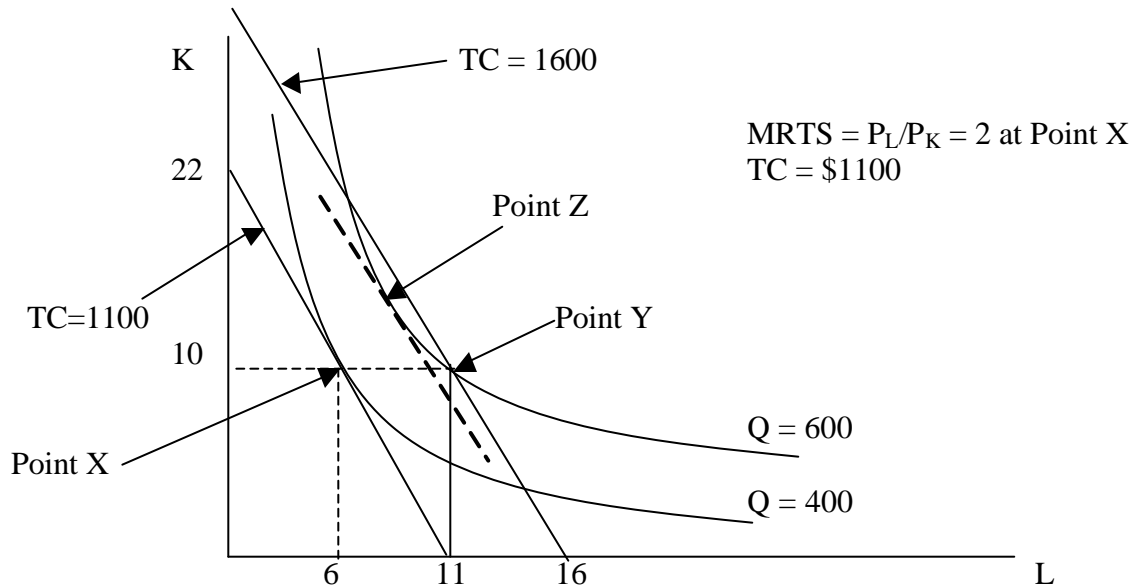
$$FC = 324 * 600 = 194400$$

$$TC = 100 * Q^2/1296 + 194,400$$

$$\mathbf{ATC = 100*Q/1296 + 194,400/Q}$$

6. Sunshine Doughnuts always produces 400 doughnuts per day using two inputs, capital, K, and labor, L. Sunshine doughnuts rents capital at a price of \$50 per day, and the workers get paid \$100 per day. They have been producing on their expansion path with 10 units of capital and 6 laborers.

- a.(8) Graph the current Sunshine Doughnuts isoquant and isocost curves below. What is the MRTS at the cost minimizing input combination? What is the total cost of production?



**Assume the expansion path is a straight line from the origin through  $K = 10$ ,  $L = 6$**

- b. (6) Suppose the firm decides to increase production to 600 doughnuts, and to do so will require an extra 5 workers (and K is fixed in the short run at 10 units). Explain whether  $MPL/PL$  will be  $>$  or  $<$   $MPK/PK$ ? Draw in the new isoquant and isocost curves in the graph above. What is the total cost of production now?

*At tangency with isocost that has slope of  $P_L/P_K=2$ ,  $MRTS = 2$ . At Point Y,  $MRTS < P_L/P_K$ . Since  $MRTS = MPL/MPK$ , at Point Y,  $MPL/MPK < P_L/P_K$ , so  $MPL/P_L < MPK/P_K$*

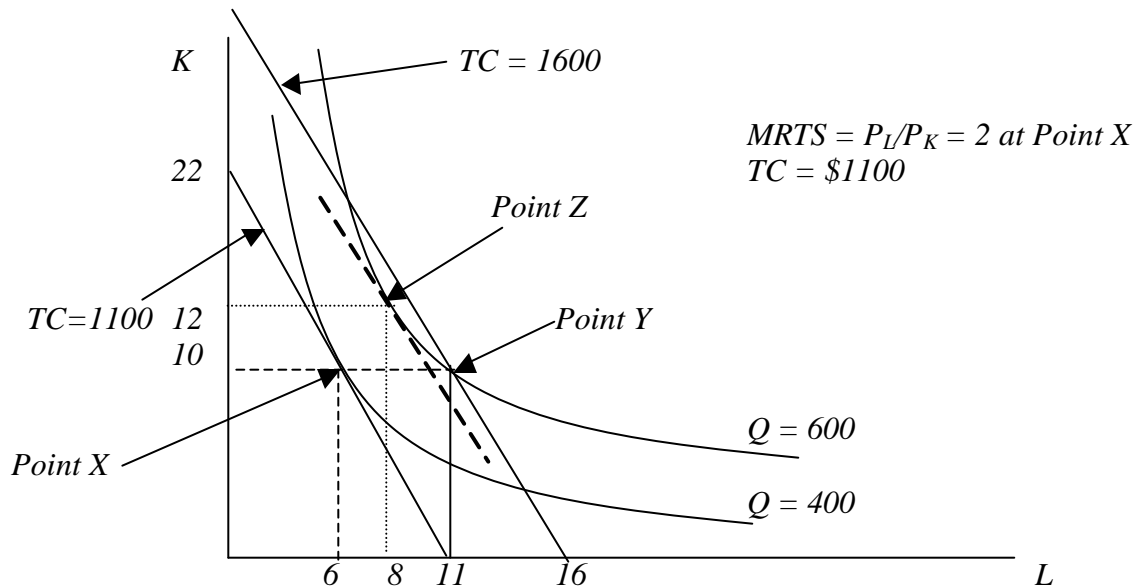
- c. (7) To minimize the cost of producing 600 doughnuts, in the long run, should Sunshine Doughnuts use **(more K and less L)** or more L and less K  
Explain the process by which the firms can lower total cost of producing 600 doughnuts by changing the quantity of each input used in the long run.

*From point Y to Point Z, giving up one L saves \$100, since the  $MRTS < 2$ , it will take less than 2 units of K to make up for the amount of production lost by the released laborer. Since two units of K would cost \$100, hiring K to make up for the lost laborer would cost less than \$100. therefore, the tradeoff of K for L would lower total cost.*

7. (8) Define the term Expansion Path. Use the idea of the expansion path to explain the difference between short run and long run marginal cost.

*The expansion path is made up of each cost minimizing input bundle for every possible level of output.*

*In the short run, if the firm is on its expansion path, increasing production necessarily means the firm will have to leave the expansion path since one or more inputs is fixed. Therefore, the change in total cost will be higher than in the long run, when the firm can move to its expansion path and produce that new level of output at the lowest possible minimum cost. Therefore, MC in the short run will always be higher than LRMC.*



*To use the previous answer for an example, the SR MC of increasing production was 2.5 ( $MC = \mathbf{D}TC/\mathbf{D}Q = 500/200 = 2.5$ ).*

*But in the long run, the firm can decrease  $L$  from 11 to 8 and increase  $K$  from 10 to 12. Then,  $TC = 1400$ . So  $LRMC = \mathbf{D}LRTC/\mathbf{D}Q = 300/200 = 1.5$ .*

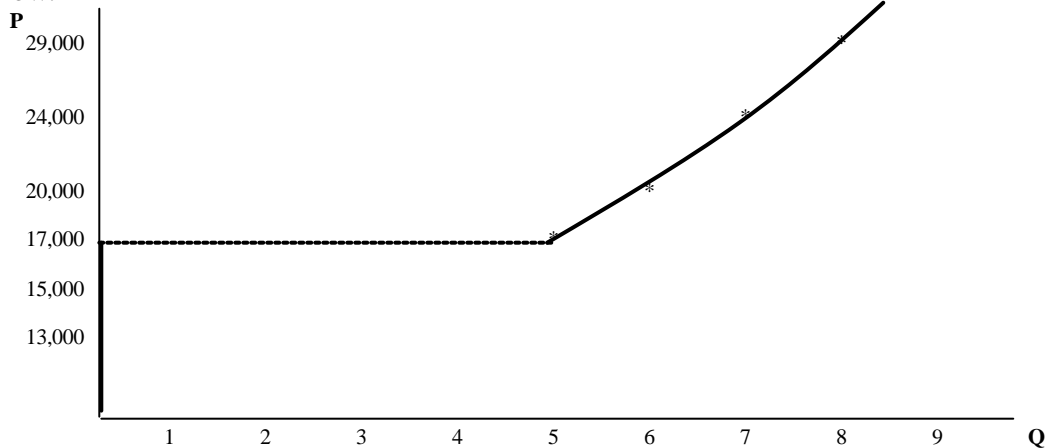
8. The H2O Swimming Pool company builds in-ground residential swimming pools. The industry is perfectly competitive and swimming pools sell for \$20,000 each.

Pools	TR	TC	MC	VC	AVC	ATC
0		60,000		0		
1	20,000	88,000	18,000	18,000	18,000	88,000
2	40,000	103,000	15,000	33,000	16,500	51,500
3	60,000	116,000	13,000	46,000	15,333	38,666
4	80,000	131,000	15,000	61,000	15,250	32,750
5	100,000	148,000	17,000	78,000	15,600	29,600
6	120,000	168,000	20,000	98,000	16,333	28,000
7	140,000	192,000	24,000	122,000	17,428	27,429
8	160,000	221,000	29,000	151,000	18,875	27,625
9	180,000	258,000	37,000	198,000	22,000	28,666

- a. (8) Please explain the firm's economic situation given the above costs. What should the owner of the company do (i.e. how many pools should they produce)? Please explain.

*MR = MC at Q = 6. At that level of output, profit = -48,000. This is bad, but FC = 60,000. That means that shutting down would be worse. So the firm should produce 6 pools.*

- b.(6) Please graph the firm's short run supply curve below for the prices indicated on the graph below.



- c.(6) Now the owner finds out that of their fixed cost, \$30,000 is an insurance premium that can be cancelled at any time, but only if they shut down. Should this new information change the firm's behavior? If so, how? And explain why.

*Since 1/2 of the FC are not sunk, the firm's choice is whether to produce 6 pools and lose \$48,000 or to shut down and have to pay a FC = \$30,000. Now the firm is better off shutting down.*

- d.(5) Finally, between what levels of output does the H2O Pool Company's production exhibit increasing marginal returns?

*IMR is indicated where MC is falling. So production exhibits IMR for Q between 0 and 3.*

9.(10) In the 1970s, over 90% of the oil consumed in the world came from OPEC countries. In 1973, OPEC succeeded in tripling the price of oil earning those countries huge economic profits. Today, less than half of the oil used in the world comes from OPEC countries (oil has now been discovered and is being exported from several other countries – including Canada, Mexico and England) and gasoline (aside from the last couple of months ) is cheaper than ever before (in real terms). According to Hazlitt, how should we view the high profits that OPEC countries earned after they raised prices so dramatically?

*Hazlitt would say that the high prices and high profits encouraged more resources to flow into oil exploration and production. Oil was found in the Gulf of Mexico and the North Sea as a result of the higher prices and the search for profit. As a result, supply increased and the price of oil and gasoline are lower now than they would be if OPEC were still practically the sole producer of oil.*