Massachusetts Institute of Technology
Department of Economics

14.01 Principles of Microeconomics
Exam 2
Tuesday, November 6th, 2007

Last Name (Please print): _____

First Name: _____

MIT ID Number: _____

Instructions. Please read carefully.

The exam has a total of 100 points. Answers should be as concise as possible. This is a closed book exam. You are not allowed to use notes, equation sheets, books or any other aids. You are not allowed to use calculators. You must write your answers in the space provided between questions. DO NOT attach additional sheets of paper. This exam consists of (18) sheets (13 pages + 5 blank pages for scratch work).

0. Circle Your Section/Recitation (1 point):

Please circle the section or recitation which you are attending below. The marked exam will be returned to you, in the section or recitation that you indicate. You will loose 1 point if you leave it unselected.

S01: MWF9	(Peter Schnabl)	R01: F10	(Rongzhu Ke)
S02: MWF10	(Chia-Hui Chen)	R02: F11	(Rongzhu Ke)
S03: MWF11	(Chia-Hui Chen)	R03: F2	(Rongzhu Ke)
S04: MWF1	(Monica Martinez-Bravo)	R04: F12	(Marco Migueis)
		R05: F1	(Marco Migueis)
		R06: F2	(Marco Migueis)

DO NOT WRITE IN THE AREA BELOW:

Question 1 __/20   Question 2 __/15

Question 3 __/10   Question 4 __/24

Question 5 __/15   Question 6 __/15

Question 0 _/1   **Total**   __/100

1. **True/False Questions** (*TOTAL: 20 points*)**:**

In this section, write whether each statement is True or False. Please fully explain your answer, using a diagram if appropriate. No credit will be given for an answer without an explanation.

(a) (*5 points*) As long as the marginal cost of production is greater than the average variable cost, the average variable cost is increasing.

(b) (*5 points*) In a perfectly competitive market with constant long run marginal cost, the consumer will bear all the taxation burden.

(c) (*5 points*) In a perfectly competitive market, firms take the market price as a given, which implies that the market demand is infinitely elastic.

(d) (*5 points*) In an exchange economy, no individual will ever prefer a point inside the utility possibilities frontier to a point on the utility possibilities frontier.

Long Questions:

2. *(15 points)* Ricardo produces widgets, using as inputs labor (L) and machines (K). His production function is given by the following equation:

$q = 10K^{2/3} + L^{1/2}$

(a) (*4 points*) What type of returns to scale (increasing/constant/decreasing) does Ricardo's production function exhibit? Explain.

At the end of last year, Ricardo bought his only machine for $1,000. He will use this machine for 5 years, after which the machine will have no value. Ricardo will calculate depreciation linearly (depreciation will be 20% of the total value of the machine per year). This machine has no other use besides Ricardo's production of widgets, and, at this moment, Ricardo cannot buy any more machines.

(b) (*4 points*) What is Ricardo's annual fixed cost of production? Is the fixed cost sunk or not? Explain.

(c) (*4 points*) What is Ricardo's demand for labor as a function of the quantity he wants to produce annually?

(d) (*3 points*) Assuming that wage equals 1, what is Ricardo's annual total cost function?

3. (*10 points*) Sally's firm produces granola bars with a fixed cost of 10 (this cost is already sunk). Her variable cost function is $VC = q^2 + 2q$.

    (a) (*4 points*) Assuming the market for granola bars is competitive, derive Sally's supply function?

    (b) (*6 points*) What is Sally's surplus if the market price is 6? What is her profit? Does she want to stay in this market? Explain.

4. (*24 points*) Suppose the demand function for corn is $Q_d = 10 - 2p$, and supply function is $Q_s = 3p - 5$. The government is concerned that the market equilibrium price of corn is too low and would like to implement a price support policy to protect the farmers. By implementing the price support policy, the government sets a support price and purchases the extra supply at the support price. In this case, the government sets the support price $p_s = 4$.

    (a) (*4 points*) Calculate the original market equilibrium price and quantity in absence of the price support policy.

    (b) (*3 points*) At the support price $p_s = 4$, find the quantity supplied by the farmers, the quantity demanded by the market, and the quantity purchased by the government.

(c) (*3 points*) Draw a diagram to show the change in the producer surplus due to the implementation of the price support policy. Calculate the change in the producer surplus.

(d) (*3 points*) Draw a diagram to show the change in the consumer surplus due to the implementation of the price support policy. Calculate the change in the consumer surplus.

(e) (*3 points*) Calculate the cost to the government to implement the price support policy. Draw a diagram to show the government cost.

(f)   (*8 points*) Suppose now the government switches from price support policy to subsidy policy. For each unit of corn produced, the government subsidizes the farmer $s = \frac{5}{3}$. Find the new equilibrium price under this subsidy policy. How much money will the government have to spend in order to implement this subsidy policy?

5. (*15 points*) Molly's company produces knee warmers according to the following production function:

$$q = (K-8)^{1/4}L^{1/4}$$

(a) (*4 points*) Assuming that the unit cost of capital (r) and the unit wage (w) are both equal to 1, derive Molly's demand for inputs—capital and labor, respectively—as a function of her choice of output (q).

(b) (*2 points*) Show that Molly's long run total cost function is given by $C(q) = 8 + 2q^2$.

The demand for knee warmers is given by $P = 40 - Q^d$. There are no costs of entry or exit for a firm on the market for knee warmers. Any firm in this market will have access to the same technology as Molly.

(c) (*6 points*) What will the price be in the long run in this market? How much will each firm produce in this market in the long run.

(d) (*3 points*) How many firms will there be in this market in the long run?

6. *(15 points)* Consider a two-person economy consists of Ann and Bob. Both of them only consume x and y. Ann's utility over these two goods is $U_A(x_A, y_A) = x_A y_A^2$ and Bob's utility is $U_B(x_B, y_B) = x_B^2 y_B$. Initially, Ann is endowed with 9 units of x and zero units of y; Bob is endowed with 6 units of y and zero units of x.

    (a) *(2 points)* Write Ann's marginal rate of substitution in terms of x_A and y_A and Bob's marginal rate of substitution in terms of x_B and y_B.

    (b) *(5 points)* Derive the equation for the contract curve.

(c) (*8 points*) Find the general equilibrium allocation of x and y among Ann and Bob of the above economy.

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