Econ 210, Final, Fall 2008.

Prof. Guse, W & L University

Instructions. You have 3 hours to complete the exam. You will answer questions worth a total of 75 points. Please write your responses on the exam itself in the space provided. If you require additional space, write on the back of the page. You may refer only to your own handwritten, “cheat sheet”. Calculators and all other references materials are not allowed. If a question asks for a numeric quantity you may leave your answer in expression form for full credit. (e.g. \( \frac{40-30}{5} \) would be perfectly acceptable in place of “2”.) Be sure to label any diagrams you draw, to show your work and to explain your reasoning. You may keep your cheat sheets. Thank you and good luck!

Name:

Pledge:
1. [10 Points] WSX Toothpaste Corporation can hire labor for $10 per hour. They make toothpaste using labor and capital. In the short run, capital is fixed at 100. Figure 1 shows WSX’s marginal and average product of labor curves for this fixed level of capital. Refer to this figure when answering the questions below.

(a) [4] The price of their output, toothpaste, is $2 per tube. How much labor should WSX hire in the short run to maximize profit?
(b) [3] What is the shutdown price?
(c) [3] Suppose WSX wanted to maximize output instead of profit. How much labor should they hire in the short-run?

![Figure 1](image-url)
2. [ 10 Points ]. Assume that both leisure and consumption are normal goods. Explain why an individual labor supply curve may be “backward-bending” - that is, portions where labor supply is decreasing in wage. Your explanation should include a diagram with budget lines for leisure and consumption.
3. [15 Points] A profit maximizing firm faces a wage for labor of $10 per hour and capital price of $40 per unit. It produces output according to

\[ y = L^{3/4} K^{1/4} \]

(a) At the optimal choice of \( L \) and \( K \), what is \( \frac{K}{L} \)?

(b) Derive the firm’s cost function.
4. [ 10 Points ] A market for breadsticks consists of three identical consumers each with the following marginal willingness to pay (MWTP) for breadsticks.

\[ MWTP_i(Q) = 3 - Q_i \]

where \( Q_i \) is the quantity consumed by person \( i \) for each of \( i \in \{1, 2, 3\} \).

(a) Derive the aggregate demand curve

(b) What is demand when the price is $2.
5. (3 Points) Suppose that an acre of land with mature orange trees on it will produce a steady harvest of 100 boxes of oranges per year forever. At current market prices of oranges of $5 per box and interest rate at 5%, what is $V_m$, the value of an acre of mature trees to an orange grower?

6. (3 Points) When are the equivalent variation and compensating variation measures of consumer surplus changes equal to each other?

7. (4 Points) Who is Michael Spence?
8. [20 points] Mercury-runoff from gold-mining operations is thought to contribute significantly to mercury levels in the Amazon and its tributaries. This is bad for the local fishing industry as their catch becomes significantly less marketable. Suppose that demand for mercury among gold-miners in the Amazon is given by the following marginal willingness to pay schedule.

\[ MWTP = 2000 - q \]

while the cost to the fishing industry of mercury in the rivers is given by the following marginal cost function

\[ MC = \frac{1}{2}q \]

where \( q \) is the quantity of mercury measured in ‘flasks’ and MWTP and MC are both measured in $/per flask. Assume that every flask demanded by gold miners eventually ends up in the river and that gold-mining is the only source of mercury pollution. Assume also that, from the gold-miner’s point of view, the supply of mercury is perfectly elastic at $500 / flask. Draw a diagram showing the demand, marginal private cost and marginal social cost of mercury in the Amazon. Indicate the following quantities on your diagram. (Calculations are not required.)

(a) Quantity demanded for Mercury without any regulation, \( Q^D_0 \)
(b) The size of an efficient Mercury tax, \( \tau_{eff} \)
(c) Demand for Mercury with the efficient tax, \( Q^D_1 \)
(d) Government revenue from an efficient tax.
(e) Savings to the fishing industry from an efficient tax.
EXTRA SPACE.