Name: ________________________________

Instructions:

Answer all of the following questions. You have the class period to complete the exam.

Answer each question clearly and concisely. You must show your work to receive credit.

This exam is given under the rules of the Montana State University. By printing your name above you acknowledge the University’s Honor Code and agree to comply with the provisions of the Honor Code. You may not use notes or receive any assistance. There is to be no talking during the exam. You may use a calculator, but are never allowed to use a device allowing you to take photographs or transmit over a network. No notes, no assistance, no talking, no cell phones, but you can use a calculator.

Clearly print your name above, in the space provided on the next page and in your blue book(s). You must turn in the exam and your blue book(s). There are two versions of the exam. **Indicate your exam version on your blue book.** It is your responsibility to make sure your version of the exam is different from the students next to you. If you have the same version as any of the students next to you, you will be asked to move.
Intermediate Microeconomics  
ECNS 301  
Spring 2011  
Exam #: 3

Name: ________________________________

<table>
<thead>
<tr>
<th>Question</th>
<th>Points</th>
<th>Score</th>
</tr>
</thead>
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<tr>
<td>1</td>
<td>20</td>
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True/False/Uncertain Plus Explanation

1. For each of the following, state whether it is true, false or uncertain and explain your answer. No points are given without explanation.

(a) The main point of the Prisoner’s Dilemma game is to show that the optimal solution is always reached when each player follows their dominant strategies.

(b) A firm never produces at a price below their average cost.

(c) For the benefit of society, governments should always regulate monopolies.

(d) As fixed costs decrease, there are more firms in a long run perfectly competitive equilibrium.

(e) A mixed strategy Nash equilibrium characterizes a certain outcome of any game.

Short Answer/Numerical

2. Two players play the following simultaneous move game. The payoffs are \((A, B)\) where \(A\) is Player 1’s payoff and \(B\) is Player 2’s payoff.

\[
\begin{array}{c|c|c|c}
\text{Player 1} & \text{Player 2} \\
\hline
\text{Strategy} & \text{L} & \text{C} & \text{R} \\
\hline
\text{T} & (1,0) & (1,3) & (3,0) \\
\text{M} & (0,2) & (0,1) & (3,3) \\
\text{B} & (0,2) & (2,4) & (5,3) \\
\end{array}
\]

(a) What is each player’s best response function? Be sure to write it out explicitly.

(b) Are there any dominant or dominated strategies? If so, indicate whether the strategy is dominant or dominated.

(c) Use the method of iterated elimination to find the unique outcome.

(d) Is this outcome a Nash equilibrium? If so why and if not why not? Are there any other pure strategy Nash equilibrium?

(e) Instead of making simultaneous choices, consider a sequential game. Is the outcome of a sequential game different and does it matter who chooses first?
3. A firm has the following production technology

\[ q = KL + 12K^2 \]

where \( q \) is output, \( K \) is capital and \( L \) is labor. The wage rate of labor is \( w = 1 \) and the rental rate of capital is \( r = 48 \).

(a) Find the marginal product of labor and the marginal product of capital.

(b) What is the marginal rate of technical substitution when \( q = \bar{q} \).

(c) When you double inputs what happens to output? What does this say about scale?

(d) Find the short run cost curve as a function of quantity when \( K = \bar{K} \).

(e) Find the long run cost curve as a function of quantity.

(f) What unexpected properties for production and costs does the firm exhibit?

4. Market demand is

\[ P = 100 - Q \]

and a firm’s cost function is

\[ C(q) = 2q^2 + 52q + 32. \]

Assume that all firms are identical.

(a) For a long run perfectly competitive equilibrium:
   i. How much does each firm produce?
   ii. What is the equilibrium price?
   iii. How many firms are there?
   iv. What is the consumer surplus and the producer surplus?

(b) Now assume that one firm is granted a patent and is a monopolist in this market.
   i. What is the equilibrium price and quantity with the monopolist?

(c) What’s the change in consumer surplus associated with the two different market structures?

(d) What’s the change in firm profits associated with the two different market structures?

(e) What’s the loss in welfare with the monopolist compared to perfect competition?

(f) How is this different than our usual deadweight loss measure?
5. There are 100 consumers and each consumer has the following preferences for the goods $q$ and $Y$

$$u(q,Y) = q^\frac{3}{4}Y^\frac{1}{4}$$

and each consumer has an income level of $m = 48$. (Consider $Y$ to be a composite good.) There is one firm who produces good $q$ with the following production technology.

$$q = \min\{4K, 5L\}$$

This firm acts as a price taker. $K$ is the amount of capital used in production which has a rental rate of $r = 8$ and $L$ is the amount of labor used in production with a wage rate of $w = 10$.

(a) What is the individual demand curve for good $q$?
(b) What is the market demand curve for good $q$?
(c) Describe the supply curve for good $q$.
(d) What is the market equilibrium price and quantity?
(e) How does the market equilibrium price and quantity change when the government imposes a lump sum tax on every consumer of $\$16$?