Intermediate Microeconomics
ECNS 301
Fall 2012

Exam #: 1
Version A

Thursday September 27, 2012

Name: ____________________________________________

Instructions:
You must either answer all of the following questions or answer exactly 4 of the following 5 questions. Make your choice clear. Regardless of your choice each question is worth the same amount. 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 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.
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 equilibrium price of elbow grease is $5 per kilogram, but the government has in place a price ceiling at $3 per kilogram. If technological improvements are made in the elbow grease-making process, the price of elbow grease will fall.

(b) A consumer with convex, ‘well-behaved’ indifference curves is indifferent between two bundles of $X$ and $Y$: (6, 10) and (8, 10). She therefore prefers the bundle (7, 11) to either of the first two.

(c) The government places a tax of $5 per unit on beeswax and we find that the price buyers pay increases by $2.50. If the tax is increased to $15, then the price buyers pay will increase by $7.50.

(d) A decrease in income of $2 is equivalent to all prices increasing by $2.

Short Answer/Numerical

2. Consider the following constrained multivariate optimization problem.

\[
\begin{align*}
\max_{x,y} f(x, y) &= 13x^2 y^5 \\
\text{subject to } 2x + y &= 35
\end{align*}
\]

For the parts below, always consider $y$ to be on the vertical axis and $x$ to be on the horizontal axis.

(a) What is the Lagrangian for this problem?

(b) Find the optimal values of $x$ and $y$.

(c) Find the optimal values of $x$ and $y$ using \( \log(f(x,y)) \) as the objective function where \( \log \) refers to the natural logarithm.

(d) Compare the optimal values of $x$ and $y$ you found. Explain any differences or similarities.
3. You go to a conference in New Orleans to present your research. After your conference duties are over you want to eat oyster po-boys and drink sazeracs (the official cocktail of New Orleans). Sazeracs cost $3 each and oyster po-boys are $7. Your lousy MSU per-diem only provides $32 for the whole trip (this is the amount of money you can spend on food and drinks). You’ve decided that while on your trip you’re going to drink 6 sazeracs and eat 2 oyster po-boys.

(a) What’s an equation describing your budget line and what’s the slope of your budget line.

(b) Now MSU changes their per-diem policy. They give you an extra $6 to spend but require you to submit receipts and charge you $1 for every drink you buy. What’s an equation describing your new budget line?

(c) Now MSU decides they can’t afford the extra $6 and changes their per-diem policy again. Instead of an extra $6 dollars they’ll only give you an extra $3, but now you don’t have to submit receipts and there is no $1 per drink penalty. What’s an equation describing your new budget line?

(d) What per-diem policy would you prefer and why?

4. The market supply and demand functions for a particular market are as follows.

\[ Q = 74 - p \]
\[ Q = p - 2 \]

The government is considering a per-unit tax of \( \tau \) to be levied on buyers.

(a) What are the equilibrium prices and quantity with the tax expressed as a function of \( \tau \)?

(b) Show that as the tax rate increases the price buyers pay increases, the price sellers get decreases and the equilibrium quantity decreases.

(c) What value of \( \tau \) maximizes tax revenue and how much tax revenue is generated?

(d) Instead of using a per-unit tax, the government decides to use an ad-valorem tax of \( \tau \) to be levied on buyers. What tax rate should be set to maximize tax revenue?
5. The market demand function for a particular good is

\[ Q = 50 - 2p + 8p_r \]

where \( Q \) is the market quantity, \( p \) is the market price, and \( p_r \) is the price of a related good. The market supply curve is described by the following.

\[ Q = 6 + 2p \]

(a) Are the two goods substitutes or complements?
(b) Find the market equilibrium price and quantity when \( p_r = 7 \), and when \( p_r = 13 \).
(c) What is the comparative static \( \frac{dp}{dp_r} \)?
(d) When thinking about the demand for this good, are consumers more sensitive to a change in the price, \( p \) or more sensitive to a change in the price of the related good, \( p_r \).