Intermediate Microeconomics
ECNS 301
Spring 2014

Exam #: 1
Version A

Friday February 7, 2014

Name: ________________________________

Instructions:
You must answer all of the following questions. 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 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 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.
   (b) If the government subsidizes one good, this may cause consumers to purchase more of all goods.
   (c) When Hurricane Katrina ripped through Mississippi in 2005, the wages of carpenters doubled. This price indicates a shortage of carpenters.
   (d) If you know the slope of the budget constraint for two goods, then you know the prices of the two goods.
   (e) Both Tums and Rolaids will cure David’s heartburn, and he regards them as perfect substitutes. Therefore, his indifference curves will be linear with a slope of $-1$.

Short Answer/Numerical

2. Consider the following constrained multivariate optimization problem.

   \[
   \max_{x,y} f(x, y) = 2x^\frac{1}{2}y^2 \\
   \text{subject to } px + 8y = 50
   \]

   \(p > 0\) is a variable. 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) What are the comparative statics of the problem: \(\frac{dx^*}{dp}\) and \(\frac{dy^*}{dp}\)?
   (d) What is the value of \(f(x, y)\) evaluated at the optimal values of \(x\) and \(y\)? Call this value \(A\) where \(A = f(x^*, y^*)\).
   (e) What is the comparative static of the value of \(f(x, y)\) evaluated at the optimal values of \(x\) and \(y\)? You can think of this as \(\frac{df(x^*, y^*)}{dp}\) or \(\frac{dA}{dp}\).
3. There are two goods: $x$ and $y$. The price of good $y$ is $1 and the price of good $x$ is $10. You have $150 to spend on good $x$ and $y$. You’ve decided to consume $x = 5$ and $y = 100$.

(a) What’s the slope of the budget line and what is the economic term we associate with the slope?

(b) The government levies a $2 per-unit tax on good $y$ (on consumers) along with an income subsidy of $200. What’s an equation describing your new budget line?

(c) The government levies an ad-valorem tax of 25% on good $y$ (on consumers) and a per-unit subsidy of $5 on good $x$. What’s an equation describing your new budget line?

(d) Considering no policy, the policy in part B and the policy in part C, what is the most preferred and least preferred policy?

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

\[
\begin{align*}
Q &= 50 - p \\
Q &= 2p - 4
\end{align*}
\]

The government is considering a per-unit tax of $\tau$ to be levied on sellers.

(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) Based on your answers above, what do we know about the relative price elasticity of supply and demand?