Intermediate Microeconomics  
ECNS 301  
Spring 2011  

Exam #: 1  
Version A  

Wednesday February 16, 2011  

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 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.
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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) Orange juice sells for $2 per gallon and gasoline sells for $1 per gallon. Although we don’t know the consumer’s utility function, we do know that if a consumer buys both goods, she receives twice as much utility from orange juice as from gasoline.

(b) A consumer with convex, ‘well-behaved’ indifference curves is indifferent between two bundles of $X$ and $Y$: $(4,1)$ and $(2,9)$. She therefore prefers the bundle $(3,8)$ to either of the first two.

(c) When Hurricane Katrina ripped through Mississippi in 2005, the wages of carpenters doubled. This price indicates a shortage of carpenters.

(d) On February 13 the price of a rose was $1 and 80 roses were purchased. On Valentine’s Day (February 14), the price of a rose jumped to $2 and 200 roses were purchased. Therefore, the elasticity of demand is approximately 1.28.

(e) If you know the slope of the budget constraint for two goods, then you know the prices of the two goods.

Short Answer/Numerical

2. A consumer has the following utility function:

$$U(c, y) = c^4 y^2$$

where $c$ is cantaloupe and $y$ is a composite good.

(a) What is the marginal rate of substitution?

(b) What is the demand function for cantaloupes? (Do not assume specific values for prices and income.)

(c) If income is $m = 900$, the price of cantaloupe is $P_c = 2$, and the price of the composite good is $P_y = 1$, what is the consumer’s optimal consumption bundle?

(d) You’ve been hired to recommend a policy that would lead consumers to increase the consumption of cantaloupes. Two policies have been proposed: a subsidy to lower the price of cantaloupes, or a cash transfer to increase income.

i. What subsidized price would lead to a doubling of cantaloupe consumption?

ii. Considering part i, what cash transfer would lead to the same doubling of cantaloupe consumption?

iii. Considering parts i and ii, which of the two policies would cost less?
3. Suppose that demand for cocaine is given by \( Q_C = 50 - P_C \) and demand for heroin is given by \( Q_H = 420 - 2P_H \). The price of cocaine is \( P_C \) and is equal to $30 per gram. The price of heroin is \( P_H \) and is equal to $60 per gram.

   (a) What is the price elasticity of demand for cocaine?
   (b) What is the price elasticity of demand for heroin?
   (c) Suppose that the government is considering two methods to reduce drug consumption: confiscating some of the drugs being sold, or legalizing drugs and taxing them. Also suppose that the government believes it can intercept 20% of the drugs on the market.
      
      i. What tax would have to be imposed on cocaine to achieve the same effect on consumption as the interception policy?
      ii. Considering part i, what tax would have to be imposed on heroin to achieve the same effect on consumption as the interception policy?

4. Consider three consumers. All three buy bread \((B)\) and cheese \((C)\), and no other goods. The price of bread is $1 per loaf, and the price of cheese is $2 per pound. Each consumer has a weekly budget of $60. Given the information below, find the utility-maximizing combination of bread and cheese for each consumer and each consumer’s level of utility.

   (a) Stephanie’s utility function is \( U(B, C) = B^{\frac{1}{2}}C^{\frac{1}{2}} \).
   (b) Evan’s utility function is \( U(B, C) = \min\{B, C\} \). In other words, he likes 1 loaf of bread with 1 pound of cheese, and likes no other combination.
   (c) Ian doesn’t care whether he has bread or cheese as long as he has some food. These goods are perfect substitutes for him, and his utility function is \( U(B, C) = B + C \).

5. In the widget market, demand and supply are given by:
\[
\begin{align*}
Q_d &= 1500 - 2P \\
Q_s &= -500 + 2P
\end{align*}
\]

   (a) Find the equilibrium price and quantity.
   (b) Now suppose the government imposes a $100 tax on suppliers of this product. Find the new equilibrium price and quantity, and the incidence of the tax.
   (c) Based on your answer to part b, what do we know about the relative price elasticity of supply and demand at the original equilibrium price?