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.
Intermediate Microeconomics
ECNS 301
Spring 2011
Exam #: 2

Name: ____________________________________________

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Total: 100
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) A firm operating with diminishing total returns cannot be profit maximizing.
(b) At low levels of production, marginal productivity of labor increases as labor increases. At high levels of production, marginal productivity of labor decreases as labor increases. These two statements are contradictory.
(c) If inputs into production cannot be substituted for each other but have to be employed in fixed-proportions isoquants are straight, downward-sloping lines.
(d) Cobb-Douglas production functions can never possess varying returns to scale.
(e) A firm may express increasing, constant and decreasing returns to scale for various levels of output.

Short Answer/Numerical

2. 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 \(U(B, C) = B^{1/2}C^{1/2}\).
(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 \(U(B, C) = B + C\).

3. A consumer has the following utility function. \[ U(x, y) = x^{1/4}y^{3/4} \]

(a) Find the general demand functions for \(x\) and \(y\) which are described as \(x^* = x(p_x, p_y, m)\) and \(y^* = y(p_x, p_y, m)\).
(b) The consumer’s current income is \(m = 100\) and current prices are \(p_x = 1\), \(p_y = 1\). What happens to the optimal bundles when \(p_x\) decreases to \(p'_x = \frac{1}{4}\)?
(c) What is the total effect of the change in \(p_x\) on \(x^*\)?
(d) How much income do you have to take away from the consumer to compensate them for the price change? (Hint: Use the new prices with the old utility level to find the change in income.)
(e) Decompose the total effect reported in part c into a substitution effect and an income effect.
4. Consumer’s consume food and other goods. The amount of food consumed is denoted \( f \) with price \( p_f \) and the amount of other goods is denoted \( y \) with price \( p_y \). In order to support farmers (and low income consumers), the state of Montana is considering subsidizing the price of food so that the quantity of food consumed by every consumer is 30. With the price subsidy the price of food becomes \( p'_f = p_f - \tau \) where \( \tau \) is the amount of the per unit subsidy. There are 1 million people in Montana and each person has the following preferences.

\[
U(f,y) = \min\{f, 4y\}
\]

\( p_y \) is normalized to 1, \( p_f = 6 \), income is \( m = 100 \), and the price subsidy considered is \( \tau = 3.75 \).

(a) How does the price subsidy change the optimal consumption bundle of each consumer? What was it before the subsidy and after?

(b) Will the food subsidy achieve its objective?

(c) If instead of a subsidy on the price food, consider an income subsidy which costs the government just as much as the price subsidy did. How much does the income subsidy cost the government and what are the optimal consumption bundles of each consumer with the income subsidy?

(d) What policy should the government implement and what policy is favored by consumers? Why?