SUID:

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Exam 2
Fall 2009

DO NOT OPEN THIS EXAM UNTIL YOU ARE TOLD TO DO SO.

Instructions

1. Write your SUID in the upper right corner of this exam. Do NOT write your name.

2. SHOW ALL YOUR WORK. Answers without supporting work will receive little or no credit.

3. Do all your work on this exam. If you need extra space, write on the backs of the pages. However, if you do write an answer on the back of a page, *be sure you've noted that near the question*.

4. There are 70 points on the exam and you'll have 80 minutes to work on it. Budget your time accordingly.

5. In case you need it, here is the general form of the Cobb-Douglas utility function and the corresponding demand equations:

$$U = X^a Y^{1-a} \qquad X = \frac{aM}{P_X} \qquad Y = \frac{(1-a)M}{P_Y}$$

Data on Households

Some of the questions will refer to the following survey data collected from several households about their consumption of goods X and Y over the last couple of years.

Table 1

	Year	Income	Px	Py	Qx	Qy
Household A	2007	1000	10	5	30	140
	2008	1200	12	4	30	210
Household B	2007	900	10	5	30	120
	2008	1200	12	4	25	225
Household C	2007	1100	10	5	100	20
	2008	1088	12	4	85	17

Part 1: Cobb-Douglas (30 points total)

Question 1(a) (10 points)

Please derive the expenditure function for a household with Cobb-Douglas preferences. Be sure to show all the steps, not just the final result. Then use the demand equations and the information in Table 1 to determine which one of the surveyed households has Cobb-Douglas preferences, and calculate the value of *a* for that household.

Question 1(b) (10 points)

Suppose that in 2009, Px = $9, Py = $6 and the household from question 1(a) has an income of $1500. Calculate the household's consumption of each good. Draw the household's budget constraint and include the numerical values of its intercepts. Also sketch several of its indifference curves and show its equilibrium on the diagram. Be sure to show your work and label everything.

Question 1(c) (10 points)

Suppose that in 2009 (the same year as the previous question), the government is considering imposing a $9 tax on good X and a $1 subsidy on good Y. You may assume the supply of both goods is perfectly elastic so that Px rises to $18 and Py falls to $5.

Please determine each the following: the new values of X and Y, the amount of revenue the government collects from the household in taxes on X, the amount it spends on the subsidy on Y, the net effect on the government's budget and the compensating variation for the policy relative to the equilibrium you calculated in 1(b). Is the household better or worse off as a result of the policy? How does the CV compare to the net effect on the government? Discuss briefly.

Part 2: Perfect Complements (20 points total)

Question 2(a) (10 points)

One of the households in Table 1 has perfect complements preferences and always buys *a* units of good X for each unit of good Y. Please derive the household's demand equations for X and Y in terms of *a*, Px, Py and income M. Be sure to show the steps involved, don't just write down the equations. Then use the data in the table to determine which household it is and calculate the value of *a*.

Question 2(b) (10 points)

Now suppose that in 2009, Px = $9, Py = $6 and the household from 2(a) has an income of $1581. Please calculate its new consumption bundle and illustrate its 2009 equilibrium with an appropriate and well-labeled diagram. Then determine how much better or worse off the household is in 2009 relative to 2008.

Part 3: Taxes and Preferences (10 points)

Suppose a household has Cobb-Douglas preferences with parameter $a = 0.5$. The household has \$1200 to spend and initially Px=10 and Py=10. The government is considering two new tax policies:

> Policy A: X is heavily taxed and Px rises to \$20; Y is untaxed and Py remains \$10.
> Policy B: both goods are moderately taxed and Px and Py both rise to \$13.35.

If the supplies of X and Y are both perfectly elastic, the amount of revenue raised by A and B will be approximately equal (you can assume that and do NOT need to prove it). Given that they raise the same amount of revenue, which tax is better and why? How much better is it?

Part 4: Two-Period Intertemporal Choice (10 points total)

An individual is concerned about consumption in two periods. Her income in period 0 is $150,000 and she knows her income in period 1 will be $250,000. She slightly prefers future consumption and would like to have 1.5 times as much consumption in period 1 as she has in period 0. She can borrow or lend at an interest rate of 20%.

Please determine her equilibrium consumption in both periods and calculate the amount she borrows or lends in period 0. Then illustrate her equilibrium with an appropriate and well-labeled graph.