SUID:

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Exam 2
Fall 2015

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. There are 72 points possible on the exam and you'll have 80 minutes to work on it. Budget your time accordingly.

4. 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.*

5. Some algebraic relationships for exponents:

$$\left(AB\right)^c = A^c B^c, \quad A^c A^d = A^{c+d}, \quad \left(A^c\right)^d = A^{cd}$$

6. The general form of the Cobb-Douglas utility function and its demand equations:

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

Question 1 (12 points)

Suppose a city currently has 10,000 apartments that each rent for $2000 per month. There is currently no rent control in effect and the market is in equilibrium. The elasticity of demand for apartments is known to be -0.2 and the elasticity of supply is known to be 2.0. The city government is considering imposing a rent ceiling at $1800 per month.

(a) *12 points*. Please determine the number of apartments that would be on the market if the rent control is adopted. Then determine the changes in CS and PS that would be caused by the policy and the DWL it would create.

Question 2 (12 points)

HH	Year	Income	Px	Py	X	Y
A	2014	1800	10	10	90	90
	2015	2400	12	8	80	180
B	2014	2600	10	10	208	52
	2015	3000	12	8	200	75
C	2014	3000	10	10	200	100
	2015	3040	12	8	190	95

One of the households in the table to the right has Cobb-Douglas preferences. In the remainder of the exam, this will be referred to as the CD household.

(a) Please determine which one is the CD household and calculate its value of g.

(b) Draw a diagram illustrating the CD household's 2015 equilibrium.

(c) Please *derive* the expenditure function for the CD household. Be sure to show all the steps, not just the final result.

Question 3 (12 points)

Now suppose that in 2015 the government is concerned about pollution (a negative externality) from good X. It wishes to reduce consumption of X by the CD household from Question 2 by imposing a $4 tax on X. To avoid hurting the household too much it also wishes to provide a $3 subsidy on Y as well as giving the household a cash transfer of $200. You may assume the supplies of X and Y are perfectly elastic so Px would rise to $16 and Py would fall to $5.

(a) Please calculate the new values of X and Y under the policy and then calculate the overall effect of each policy on the government's budget. Does the policy break even?

(b) Please calculate the compensating variation for the policy and indicate whether the household is better or worse off.

Question 4 (12 points)

One of the households in the table to the right regards X and Y as perfect complements and always buys *d* units of good X for each unit of good Y. In the remainder of the exam, this will be referred to as the PC household.

HH	Year	Income	Px	Py	X	Y
A	2014	1800	10	10	90	90
	2015	2400	12	8	80	180
B	2014	2600	10	10	208	52
	2015	3000	12	8	200	75
C	2014	3000	10	10	200	100
	2015	3040	12	8	190	95

(a) Determine which one of the households in the table has perfect complements preferences and calculate the value of *d*.

(b) Please *derive* the PC household's demand equations for X and Y in terms of *d*, Px, Py and income M. Be sure to show the steps involved, don't just write down the equations.

Now suppose that in 2015 government imposes a \$4 tax on Y and its price rises to \$12 (that is, starting from the numbers above—don't include the policy in the previous question). At the same time, it gives the household a cash transfer of \$344.

(c) Please compute the PC household's new equilibrium and show it on a diagram. Then calculate the CV for the policy and indicate whether the household is better or worse off. Finally, calculate the revenue for the policy and determine the overall change in SS.

Question 5 (12 points)

A household buys two goods, X and Y, and its preferences can be represented by the utility function shown below. Also shown are the household's demand equations and its expenditure function. Be careful about subscripts: the numerators and the denominators in the demand equations are both different.

$$U = X^{0.5} + Y^{0.5} \qquad X = \frac{M * P_y}{P_x * (P_x + Py)}$$

$$M = \frac{U^2 * (P_x * P_y)}{P_x + P_y} \qquad Y = \frac{M * P_x}{P_y * (P_x + P_y)}$$

Initially, Px=$10, Py=$20 and M=$3000. The government is considering a policy that would place a $10 tax on X while also giving the household a $1000 cash transfer. The supply of X is perfectly elastic and Px would rise to $20.

(a) Please calculate the initial equilibrium before the policy is enacted, the new equilibrium with the policy in place, and then calculate the compensating variation for the policy. Is the household better or worse off?

Question 6 (12 points)

An individual is concerned about consumption in two periods: 0 and 1. She would like to have 3 units of consumption in period 0 for each unit in period 1, and she can borrow or save at an interest rate of 20 percent. In period 0, she has an income of $200,000. In period 1, she expects that many other people will take up her career and her income will be driven down to $50,000. However, she has also has an opportunity to spend $20,000 in period 0 on training in a new career that would raise her period 1 income by $50,000.

(a) Please determine whether or not she should take the career traning.

(b) Given your result from part (a), now determine how much she consumes in each period and determine the amount she borrows or saves in period 0.

(c) Illustrate your results with an appropriate diagram showing her intertemporal budget constraints with and without training, an indifference curve, her equilibrium, and the amount of borrowing or saving.