SUID:

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Exam 2
Fall 2014

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:

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

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

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

Question 1 (9 points)

HH	Year	Income	Px	Py	X	Y
A	2013	2600	8	10	200	100
	2014	2160	9	9	160	80
B	2013	1800	8	10	125	80
	2013	2160	9	9	120	120
C	2013	800	8	10	30	56
	2014	990	9	9	33	77

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 *a*.

(b) Draw a diagram illustrating the CD household's 2014 equilibrium.

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

Question 2 (15 points)

Suppose that in 2014 the government wishes to shift the CD household's consumption away from good Y. It is considering the two policies below:

Policy A: $5 tax on Y, $3 subsidy on X, and a $110 payment to the household.
Policy B: $5 tax on Y, no subsidy on X, and a $330 payment to the household.

You may assume that supplies of X and Y are perfectly elastic so Px and Py change by the amount of the tax or subsidy: i.e., Py=$14 in both and Px=$6 in A or Px=$9 in B.

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

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

(c) Which policy is better for reducing Y? Which is preferred by the household?

Question 3 (9 points)

One of the households in the table to the right regards X and Y as perfect complements and always buys *b* 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	2013	2600	8	10	200	100
	2014	2160	9	9	160	80
B	2013	1800	8	10	125	80
	2014	2160	9	9	120	120
C	2013	800	8	10	30	56
	2014	990	9	9	33	77

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

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

Question 4 (15 points)

Suppose that in 2014 the government decides to impose $4 tax on Y to raise revenue. You may assume the supply of Y is perfectly elastic so Py would become $13. In addition, the government gives a $10 payment directly to the household.

(a) Determine the household's new consumption of X and Y and illustrate the new equilibrium with an appropriate diagram (just the new equilibrium: you don't need to include the original 2014 equilibrium).

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

(c) Calculate the overall effect of the policy on the government's budget and then determine the amount of deadweight loss.

Question 5 (12 points)

A household buys two goods, X and Y, and its preferences can be represented by the utility function shown below (a generalization of Cobb-Douglas known as Stone-Geary). 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.

$$U = (X-20)^{0.5}(Y+20)^{0.5} \qquad X = 10 + \frac{0.5M + 10P_y}{P_x}$$

$$M = 20(P_x - P_y) + 2U(P_x)^{0.5}\left(P_y\right)^{0.5} \quad Y = -10 + \frac{0.5M - 10P_x}{P_y}$$

Initially, Px=$10, Py=$10 and M=$2000. The government is considering a policy that would place a $10 tax on X. The supply of X is perfectly elastic and Px would rise to $20.

(a) Please calculate the initial equilibrium before the policy is enacted and the new equilibrium with the policy in place. What is the total change in X?

(b) What is the compensating variation for the policy? Is the household better or worse off?

(c) Calculate the policy's income and substitution effects for the X good.

Question 6 (12 points)

An individual is concerned about consumption in two periods: 0 and 1. In period 0, she works and has an income of $180,000. In period 1, she expects to be retired and receiving a pension of $60,000. She would like to have 2 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.

(a) Please calculate how much she consumes in each period and determine the amount she borrows or saves in period 0.

(b) Illustrate your results with an appropriate diagram showing her intertemporal budget constraint, an indifference curve, her equilibrium, and the amount of borrowing or saving.