SUID:

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Exam 2
Fall 2011

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

5. Most of the questions have several steps. For clarity, they are indicated by ***1a***, ***1b***, etc. in the text.

6. Some algebraic relationships for exponents:

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

7. 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 (12 points)

One of the households in the table below has Cobb-Douglas preferences. ***1a*** Using the data for 2009 and 2010, please determine which one and calculate the value of *a* for that household. Next, ***1b*** determine the household's 2011 consumption of X and Y. ***1c*** Draw the household's 2011 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.

			Household A			Household B			Household C		
Year	**Px**	**Py**	**Income**	**Qx**	**Qy**	**Income**	**Qx**	**Qy**	**Income**	**Qx**	**Qy**
2009	10	12	2100	150	50	1200	65	46	1000	70	25
2010	8	16	2400	180	60	1500	125	31	1600	140	30
2011	6	18	1800	??	??	2100	??	??	1500	??	??

Question 2 (12 points)

2a Please derive the expenditure function for a household with Cobb-Douglas preferences. Be sure to show all the steps, not just the final result. Now ***2b*** compute the expenditure needed in 2011 for the household to be exactly as well off as it was in 2010. ***2c*** Considering the household's actual income in 2011, how much better or worse off is it than it was in 2010? Be sure to be clear about whether the household has gained or lost.

Question 3 (12 points)

3a A household regards X and Y as perfect complements and always buys *b* units of good X for each unit of good Y. Please derive the 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. Now ***3b*** determine which one of the households in the table below (same as the previous table) has perfect complements preferences and calculate the value of *b*. Finally, ***3c*** determine the household's 2011 consumption of X and Y.

			Household A			Household B			Household C		
Year	**Px**	**Py**	**Income**	**Qx**	**Qy**	**Income**	**Qx**	**Qy**	**Income**	**Qx**	**Qy**
2009	10	12	2100	150	50	1200	65	46	1000	70	25
2010	8	16	2400	180	60	1500	125	31	1600	140	30
2011	6	18	1800	??	??	2100	??	??	1500	??	??

Question 4 (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:

$$U = \frac{XY}{X+Y} \qquad X = \frac{M}{P_X^{0.5}\left(P_X^{0.5} + P_Y^{0.5}\right)}$$

$$M = U\left(P_X^{0.5} + P_Y^{0.5}\right)^2 \qquad Y = \frac{M}{P_Y^{0.5}\left(P_X^{0.5} + P_Y^{0.5}\right)}$$

Please note that the denominators in the two demand equations are not identical. Initially, Px=$16, Py=$16 and M=$3200.

4a Please calculate the initial equilibrium. Now suppose the government is considering a $9 tax on good X. The supply of the good is perfectly elastic and its price would rise to $25. The household's income and the price of Y would be unchanged. ***4b*** Please calculate the compensating variation for this policy. Is the household better or worse off? ***4c*** How much revenue would the tax raise? ***4d*** How much deadweight loss does it create?

Question 5 (12 points)

5a Calculate the income and substitution effects associated with the tax policy from Question 4. Now draw a diagram for Question 4. Show ***5b*** the initial budget constraint and equilibrium, ***5c*** the new budget constraint and equilibrium with the tax in place, and ***5d*** the equilibrium associated with the CV (point 3 in the usual diagram), and ***5e*** the income and substitution effects. Please label the graph thoroughly.

Question 6 (12 points)

Two households, A and B, each consume two goods, X and Y. Household A has Cobb-Douglas preferences with Ua=(Xa^0.5)*(Ya^0.5) and demands Xa=0.5*Ma/Px and Ya=0.5*Ma/Py. Household B regards X and Y as perfect complements at a 1 to 1 ratio and has demands Xb=Mb/(Px+Py) and Yb=Mb/(Px+Py). Initially, Px=$10, Py=$10 and Ma and Mb are both $100.

The government adopts a new policy that lowers Px to $5 and raises Py to $16. ***6a*** Compute the CV for each household. ***6b*** Briefly explain the reason why the results are similar to, or different from, one another. ***6c*** Indicate whether each household would be likely to support or oppose the policy.