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Exam 2
Fall 2006

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

Instructions

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

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

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*.

Please note that the problems are NOT equally difficult. Be sure to do the easiest ones first.

Some helpful PV formulas:

(1) $\frac{B_t}{(1+r)^t}$ (2) $\frac{B}{r}$

Some helpful factors in case your calculator can't handle exponents:

t	1	5	10	15	20	25	30	35	40
(1.05)^t	1.0500	1.2763	1.6289	2.0789	2.6533	3.3864	4.3219	5.5160	7.0400

Part 1 (40 points total)

A consumer buys two goods, X and Y. Her preferences can be represented by the Cobb-Douglas utility function shown below. Also shown are her demand equations and her expenditure function.

$$U = X^{0.25} * Y^{0.75}$$
$$X = 0.25*M/Px$$
$$Y = 0.75*M/Py$$
$$M = U * (Px/0.25)^{0.25} * (Py/0.75)^{0.75}$$

Initially the price of X is \$2, the price of Y is \$2, and she spends \$800 on the two goods in total.

Question 1a (20 points)

Solve for her initial consumption of X and Y. Draw her budget constraint and include the numerical values of its intercepts. Also sketch several of her indifference curves and show her initial equilibrium on the diagram. Be sure to show your work and label everything.

Question 1b (20 points)

Now suppose that the government imposes a $1 *subsidy* on X and its price *falls* to $1. Calculate the consumer's new equilibrium consumption of X and Y and draw an appropriate diagram. What is the compensating variation associated with the subsidy? Briefly explain what that tells you about the effect of the subsidy on the consumer. What is the government's total expenditure on the subsidy? Comment on the difference, if any, between the CV and the expenditure on the subsidy.

Part 2 (20 points total)

Suppose a particular city is home to a major league sports team that wants a new stadium. The team would like the city to contribute \$300 million toward the cost of construction (in year 0). In exchange, the team would pay an extra \$15 million each year in property taxes for 30 years (years 1-30). In addition, the stadium would raise sales tax revenue by \$5 million per year every year forever (beginning in year 1).

Please draw a diagram showing the cash flows to and from the city associated with the agreement. Calculate the net present value of the agreement from the city's point of view, and discuss whether it would be a good idea to proceed. You may assume that the interest rate is 5%, and that construction can be completed in year 0 (that is, you don't need to worry about delays due to construction).

Part 3 (40 points total)

A city is considering a major urban renewal project for its decaying downtown harbor area. To carry out the project, the city would need to spend $30 million a year for 10 years (years 1-10). Beginning in year 11, the new harbor would provide $20 million in benefits to the city every year forever.

Question 3a (20 points)

Please draw an appropriate cash flow diagram and determine whether it is a good idea to go ahead with the project. You may assume the interest rate is 5%.

Question 3b (20 points)

Now suppose that the $30 million annual cost would need to be raised by imposing a new sales tax (in years 1-10) on some of the goods bought by the city's residents. To keep things simple, you may assume the residents can be treated like one big household. The household has $130 million per year, which it spends on two goods, X and Y. It likes to have exactly 2 units of Y for each unit of X. The price of X is initially $10 and the price of Y is initially $5.

A consultant has proposed raising the $30 million by imposing a $6 tax on X. Will that actually work (that is, will it produce at least $30 million in revenue)? What is the compensating variation associated with the tax? Taking that into account, is the project still a good idea? Explain.