SUID:

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Exam 2
Fall 2005

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*.

You may *not* discuss *anything* about the exam with *anyone* until after 3pm today. If you hear someone else from class discussing the exam, you *must* let me know.

Some helpful PV formulas:

$$(1)\ \frac{B}{(1+i)^t} \qquad\qquad (2)\ \frac{B}{i}$$

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.

$U = X^{0.5} * Y^{0.5}$
$X = 0.5*M/Px$
$Y = 0.5*M/Py$
$M = U * (Px/0.5)^{0.5} * (Py/0.5)^{0.5}$

Initially the price of X is \$1, the price of Y is \$4, and she spends \$1000 on the two goods in total.

Question 1a (15 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 (15 points)

Now suppose that the government imposes a $3 tax on X and its price rises to $4. Calculate the consumer's new equilibrium consumption of X and Y and draw an appropriate diagram. What is the compensating variation associated with the tax? How much revenue does the tax raise? Comment on the difference, if any, between the CV and the revenue raised.

Question 1c (10 points)

Suppose that *instead* of the policy in part (b), the government had imposed a 60% tax on *each* of the goods. That is, the tax raises the price of X to $1.60 and the price of Y to $6.40. Would this policy be better or worse than the one in part (b)? Be sure to be quantitative, and to address all the key issues.

Part 2 (35 points total)

The City of Syracuse and property developer Robert Congel have been negotiating over the terms of a deal under which Congel would redevelop a parcel of land near downtown into a large mall known as "Destiny USA". Congel would like the city to give up property taxes on the parcel for 30 years. In return, the city could expect to earn higher property taxes after the 30 years.

You may assume that property taxes on the land *without* Destiny would be $10 million per year forever starting in year 1; *with* Destiny, property taxes would be $100 million per year starting in year 31. You may also assume that the interest rate is 5%.

Question 2a (20 points)

Please draw a diagram showing the cash flows 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 have read about Destiny in the news. If so, please ignore any effects of the mall other than those noted in this problem.*)

Question 2b (15 points)

How would your decision be affected if the Destiny produced only $50 million per year in property taxes? Please be quantitative! What is the minimum annual property tax revenue for the project to be carried out?

Part 3 (25 points)

A town in considering a major investment that would improve its water supply system. The project would cost $4 million per year for 4 years (to be paid in years 1 through 4). When the improvements are complete, the upgraded system will deliver $1 million per year of benefits forever in the form of cleaner, healthier water (the benefits begin in year 5).

The town will have to raise property taxes to pay for the project, and a consultant has determined that the compensating variation for a dollar of property tax revenue is $1.20. (That is, the tax has a DWL of $0.20 per dollar of revenue).

Is it a good idea to go ahead with the project? You may assume the interest rate is 5%. Be sure to show all your work and explain your reasoning.