ECO 401-001
Spring 2005
Test #1

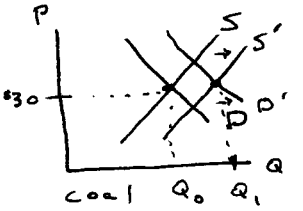
Name: KEY

ID #: _____

Questions 1-5: multiple choice, 5 points each, circle correct answer.

1. The market for coal is in equilibrium at a price per ton of $30. Then two things happen simultaneously. First, the prices of oil and of natural gas, substitute forms of energy, both rise. Second, the EPA gives approval to a new technology that lowers the cost of mining coal that involves removing entire mountaintops. After the market reaches a new equilibrium, we can predict that

C
   a) The price of coal will rise, but equilibrium quantity may either rise or fall.
   b) The price of coal will fall, but equilibrium quantity may either rise or fall.
   c) The quantity of coal exchanged will rise, but price may either rise or fall.
   d) The quantity of coal exchanged will fall, but price may either rise or fall.



2. Demand for a commodity is predicted to be more elastic

D
   a) If there are few substitutes for the commodity.
   b) If the commodity makes up a small part of the consumer's budget.
   c) The more time producers have to adjust to a price change.
   d) The more time consumers have to adjust to a price change.

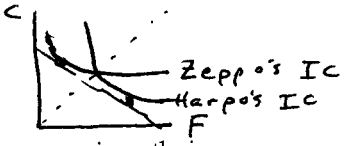
3. The demand for roller coaster rides on the Beast is given by $X = 5 - P_X$, where X represents the number of times per visit that a consumer rides the Beast and P_X represents the consumer's marginal willingness to pay for each additional ride. The maximum entry fee such a consumer would pay for a pass that permitted him or her to ride as many times as desired "for free" is

B
   a) $5
   b) $10
   c) $15
   d) $20

$CS = 4 + 3 + 2 + 1 = 10$

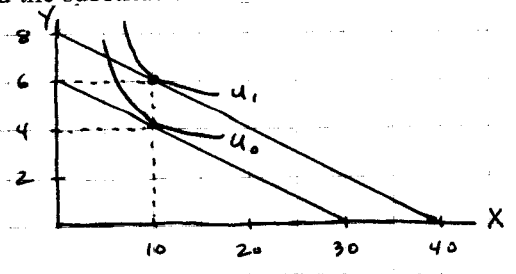
4. When Harpo consumes equal amounts of food (X) and clothing (Y), his marginal rate of substitution between the two goods is two units of clothing for one unit of food. When Zeppo consumes equal amounts of food and clothing, his marginal rate of substitution is one unit of clothing for two units of food. If they both face the same market prices for food and clothing, then we can conclude

A
   a) Harpo will consume relatively more food than will Zeppo.
   b) Zeppo will consume relatively more food than will Harpo.
   c) They will both consume equal amounts of food and clothing.
   d) We can't really predict how much food and clothing they will each consume, since their brother Groucho usually makes all their decisions for them.

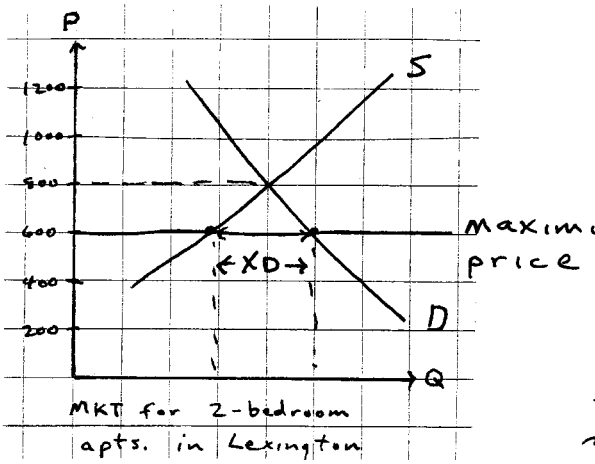


5. When your income is $30, P_X = $1, and P_Y = $5, you consume 10 units of good X. When your income increases to $40 and the prices of X and Y stay the same, you consume 6 units of good Y. From this we can conclude:

D
   a) Y is a normal good.
   b) If P_X were to change, then the total effect of the price change and the substitution effect of the price change would be equal to each other.
   c) The income elasticity of demand for good X is equal to zero.
   d) All of the above.

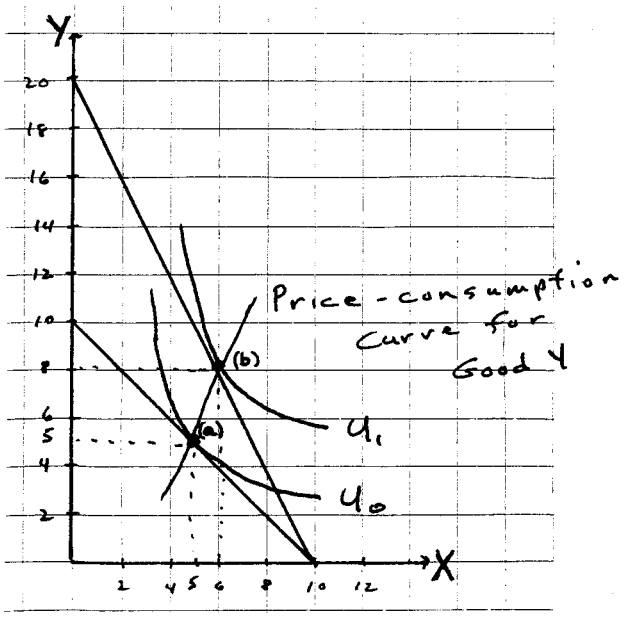


6. (10 pts.) A typical two bedroom-two bath apartment in Lexington rents for $800 per month, with utilities and cable TV included in the rent. City council, in an effort to protect poor college students from greedy landlords, passes a rent control ordinance that places a legal ceiling of $600 on the monthly rent that can be charged for a two bedroom apartment. What will be the effect on the market for two bedroom apartments? Illustrate in a supply-demand diagram.
Can you think of any unintended side effects of such an ordinance?



More people will want to rent 2 bedroom apts. at $600 per month than landlords will supply at that price, so there will be a shortage. Apartment owners will probably eliminate "free" utilities and cable. They may cut out amenities and reduce maintenance and upkeep. They may charge exorbitant damage deposits.

7. (20 pts.) You consume two goods, X and Y. Your income is $100 per month. Initially P_X = $10 and P_Y = $10. Under these conditions you choose to consume 5 units of good X.
   a) How much Y do you consume? Illustrate in the diagram below.
   b) P_Y falls to $5. In response you increase your consumption of X to 6. Illustrate these new conditions and sketch the price-consumption curve for good Y.
   c) Calculate the cross-price elasticity of demand between X and P_Y.



(a) $P_X \cdot X + P_Y \cdot Y = I$; $P_X = 10, P_Y = 10, I = 100$

$Y^* = 5$, $X^* = 5$ at point (a)

(b) $P_Y = 5$, $P_X = 10$, $I = 100$, $X^* = 6$

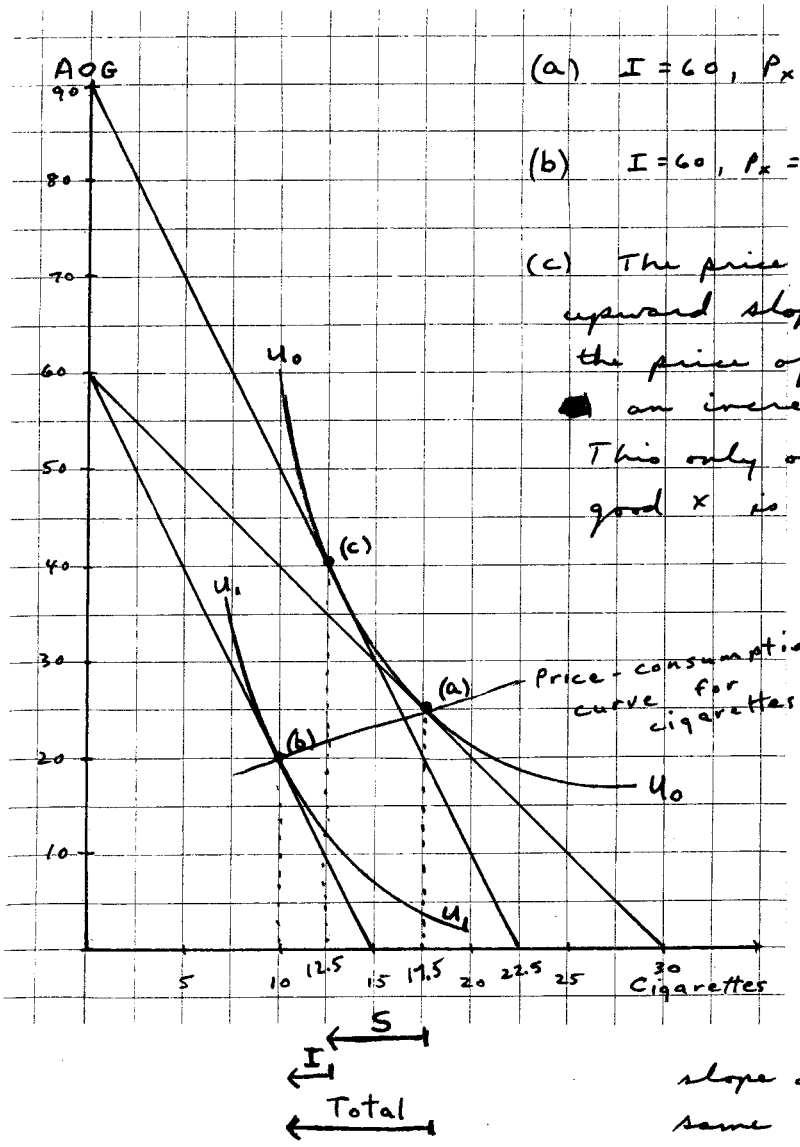
so $Y^* = 8$ at point (b)

(c) $$\varepsilon_{x,P_y} = \frac{\%\,\Delta X}{\%\,\Delta P_Y} = \frac{\frac{\Delta X}{\frac{1}{2}(X_0 + X_1)}}{\frac{\Delta P_Y}{\frac{1}{2}(P_Y^0 + P_Y^1)}}$$

$$\varepsilon_{x,P_y} = \frac{\frac{1}{\frac{1}{2}(5+6)}}{\frac{-5}{\frac{1}{2}(10+5)}} = \frac{\frac{1}{11}}{-\frac{5}{15}} = -\frac{3}{11}$$

$$\varepsilon_{x,P_y} = -.27$$

8. (25 pts.) Madeline leaves home in Tennessee and goes off to college in Kentucky. During her freshman year her parents give her a monthly allowance of $60. She chooses to consume 17.5 packs of cigarettes at $2 per pack and 25 units of other goods at $1 per unit. Her level of utility under these conditions is U_0.
   a) Illustrate Madeline's initial situation in the diagram below.
   b) The Kentucky legislature imposes a tax on cigarettes that causes their price to rise to $4 per pack. Madeline reduces her consumption to 10 packs per month. Her level of utility drops to U_1. Illustrate.
   c) Is Madeline's demand for cigarettes elastic or inelastic? Briefly explain how you arrived at your answer.
   d) Illustrate the income and substitution effects of this increase in the price of cigarettes from $2 to $4. An additional piece of information that will help you answer this question is that during her senior year in high school back in Ohio, where the price of cigarettes has always been $4 per pack, her monthly allowance was $90 and she smoked 12.5 packs per month. Her level of utility under those conditions was the same, U_0, as when she arrived at UK and found the price of cigarettes to be $2 per pack and smoked 17.5 packs per month.



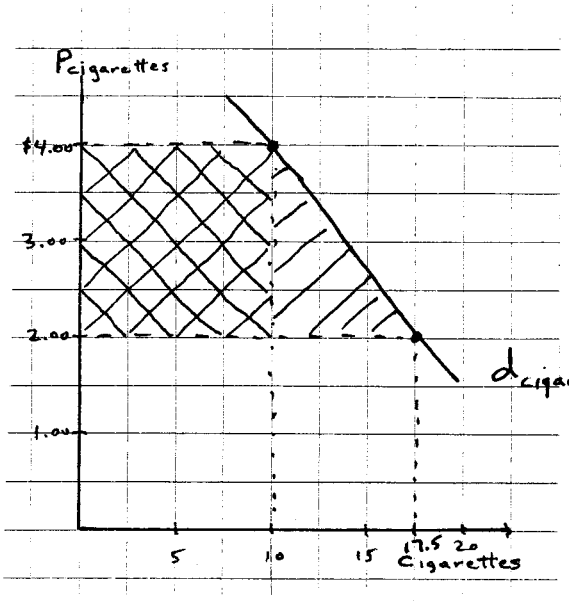
(a) $I = 60$, $P_x = 2$, $P_y = 1$, $X^* = 17.5$ $Y^* = 25$

(b) $I = 60$, $P_x = 4$, $P_y = 1$, $X^* = 10$, $Y^* = 20$

(c) The price consumption curve is upward sloping, so an increase in the price of X is associated with an increase in expenditures on X. This only occurs if the demand for good X is inelastic.

(d) The total effect of the price increase for good X is from 17.5 packs to 10 packs of cigarettes per month. The substitution effect holds utility constant at U_0 and changes the slope of the budget constraint, i.e. from bundle (a) back to bundle (c). The income effect keeps the slope of the budget constraint the same but reduces nominal income, i.e. from bundle (c) back to bundle (b).

9. (20 pts.) (a) Using the information from the above question, illustrate Madeline's demand curve for cigarettes when her income is $60 per month.
(b) What is Madeline's loss in consumer's surplus when the tax on cigarettes is imposed? Show in your diagram.
(c) How much revenue does Kentucky collect from Madeline as a result of the cigarette tax? Show in your diagram.

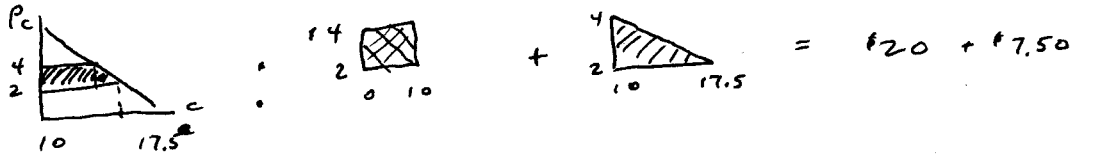


(a) $P_{cig} = \$2$, $Q_{cig} = 17.5$

$P_{cig} = \$4$, $Q_{cig} = 10$

$d_{cigarettes}(P_{cig}, P_{OG} = \$1, I = \$60)$

(b) loss in consumer's surplus is the area under the demand curve between prices \$4 and \$2.



$= \$20 + \$7.50$

The loss in consumer's surplus is \$27.50

(c) The government collects \$2 per pack and Madeline purchases 10 packs per month, so the total tax revenue from Madeline is \$20. It is the cross-hatched rectangle.