Econ 100
Exam 2
Fall 1998

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1) What is an income effect? (5 points)

a) a line parallel to the new budget constraint that touches the old indifference curve
b) the amount by which consumption changes when prices change, holding income constant
(c) the amount by which consumption changes when income changes, holding prices constant
d) a parallel shift in the budget constraint

2) The marginal rate of technical substitution is : (5 points)

a) the amount by which output increases when an input is increased by 1 unit
b) the amount by which revenue increases when an input increases by 1 unit
(c) the firm's ability to substitute one input for another while producing the same level of output
d) the firm's marginal physical product holding constant the level of output

3) Firm A's production function is $F(K,L)=(K+L)/K^2$. Does Firm A exhibit increasing, constant, or decreasing returns to scale? (5 points)

$F(2K,2L) = \frac{(2K+2L)}{(2K)^2}$ 1 point

$= \frac{2(K+L)}{4K^2} = \frac{1}{2} F(K,L)$ 2 points

decreasing 2 points

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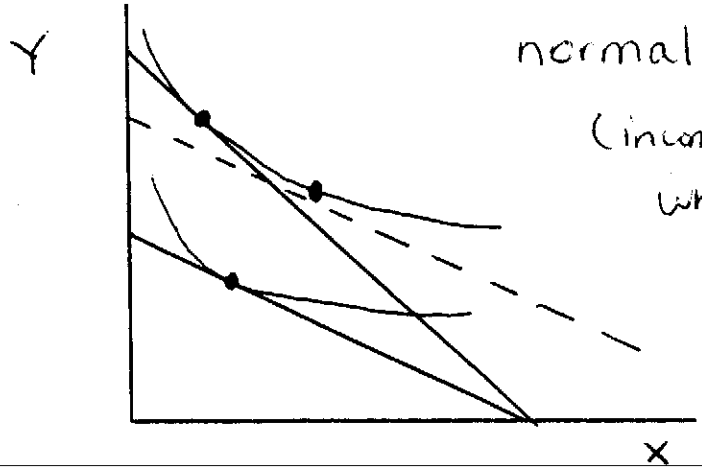
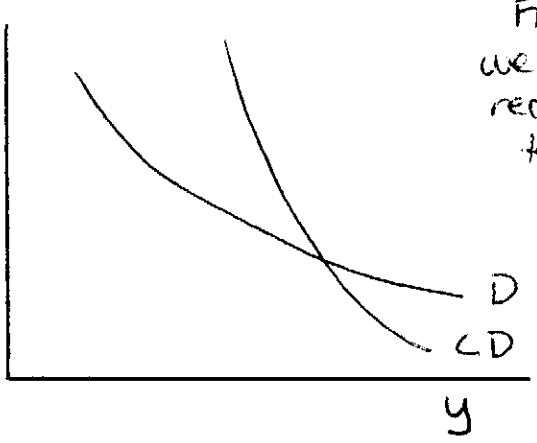
4) a) Is good Y on the diagram below a normal good or an inferior good? (5 points)



normal

(income effect ⇒ power when P_y↑ and y↓)

b) Based on the diagram above, draw the regular demand curve for Y and the compensated demand curve for Y. Explain why the slope of the regular demand curve differs from that of the compensated demand curve. More thorough answers will receive more points (7 points)



3 for diagram
4 for explanation

From the diagram above, we see that the sub effect reduces Y less than the total effect. In other words, the change in price leads to a smaller change in Q demanded than we would observe if income were not compensated

5) Priscilla lives two periods. In the first period her income is fixed at $4,000. In the second period, it is $2,200. She can borrow and lend at the market interest rate of 10 percent. Consumption goods cost $1 per unit this year and there is no inflation. Priscilla's utility function is $U(C_1C_2) = C_1^2 C_2^2$.

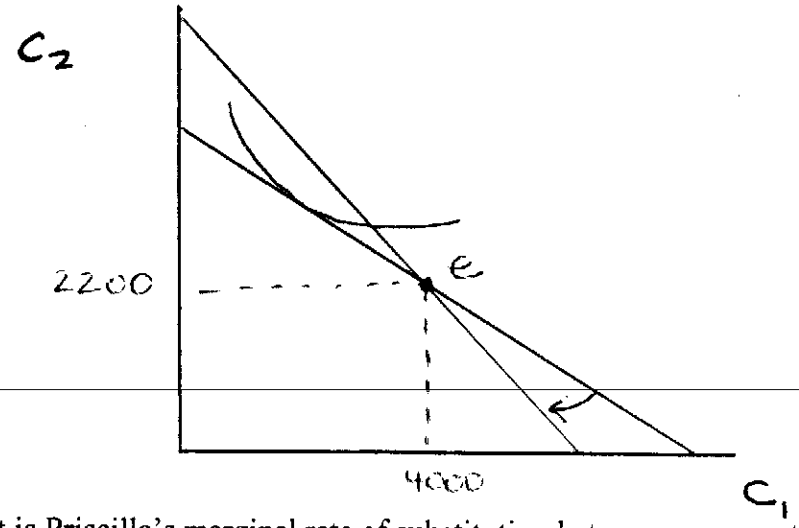
a) What is the future value of Priscilla's income? (5 points)

$4000(1.1) + 2200 = 6600$

(4) (5)

if BConstraint is written then (3)

b) On the diagram below, draw Priscilla's budget constraint, and clearly identify the point on the budget constraint such that Priscilla is fully spending her income in each period. (4 points)



c) What is Priscilla's marginal rate of substitution between consumption this year and consumption next year, when C1=1 and C2=10? (5 points)

$$MRS = \frac{\frac{\partial U}{\partial C_1}}{\frac{\partial U}{\partial C_2}} = \frac{2C_1C_2^2}{2C_1^2C_2} = \frac{C_2}{C_1} = 10$$

① ② ① ①

d) Write down Priscilla's budget constraint. (4 points)

either FV or PV is fine

FV $4000(1.1) + 2200 = C_1(1.1) + C_2$

or $6600 = C_1(1.1) + C_2$

PV $4000 + \frac{2200}{1.1} = C_1 + \frac{C_2}{1.1}$

or $6000 = C_1 + \frac{C_2}{1.1}$

e) How much will Priscilla consume in period 1? In period 2? (5 points)

MRS: $\frac{C_2}{C_1} = 1.1$ so $C_2 = 1.1C_1$ (1)

BC: $6600 = 1.1C_1 + C_2 = 2C_2$ (2)

$C_2 = 3300$ (1)

$C_1 = \frac{3300}{1.1} = 3000$ (1)

f) Draw an indifference curve on the diagram above (in Part B) that would be consistent with Priscilla's preferences. (3 points)

Note: Priscilla is a saver

g) Now, the interest rate rises to 20%. Show what happens to Priscilla's budget constraint on the diagram in Part B. Use an arrow to show how the budget constraint changes (4 points)

h) How will the change in the interest rate affect her saving/borrowing? Explain, using income and substitution effects. (4 points) (2) Cannot determine how saving will change

She is a saver

(1) ∴ income effect = i↑ ⇒ richer ⇒ ↑C_1 & ↑C_2

(1) substitute effect = i↑ so current consumption more expensive $C_1 \downarrow$ $C_2 \uparrow$

5) Firm A's production function is $F(K, L) = (4K + 2L)^{1/2}$. The price of output is \$100 per unit, the wage rate is \$5 per laborer, and the price of K is \$1.

a) Find the marginal physical product of labor. (6 points)

$MPP_L = \frac{\partial F}{\partial L} = \frac{1}{2}(4K+2L)^{-1/2}(2)$ — (2)

(1) $= \frac{1}{(4K+2L)^{1/2}} = \underbrace{\frac{1}{(4K+2L)^{1/2}}}_{(2)}$

b) Find three combinations of L and K that are on the isoquant F=3. (6 points)

$4K + 2L = 9$

2 for each

$K = 6/4$ $L = 3/2$

$K = 3/4$ $L = 6/2$

$K = 0$ $L = 9/2$

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6) Cowville is considering the possibility of publishing a tourism brochure. The cost of putting the brochure together is $1000. It is estimated that if the brochure is circulated, it will bring in additional tourism that will generate $400 more dollars **annually**, to local merchants. The additional revenues will be accrued starting in the year after the brochure is published. After three years, the brochure will not bring in any more tourists and the additional revenues will cease. The interest rate is 10%. Is it worthwhile for Cowville to invest in the brochure? (Hint: $1.1^2=1.2$ and $1.1^3=1.3$ and $1.1^4=1.5$ and $1.1^5=1.61$) (8 points)

PVC = 1000 (1)

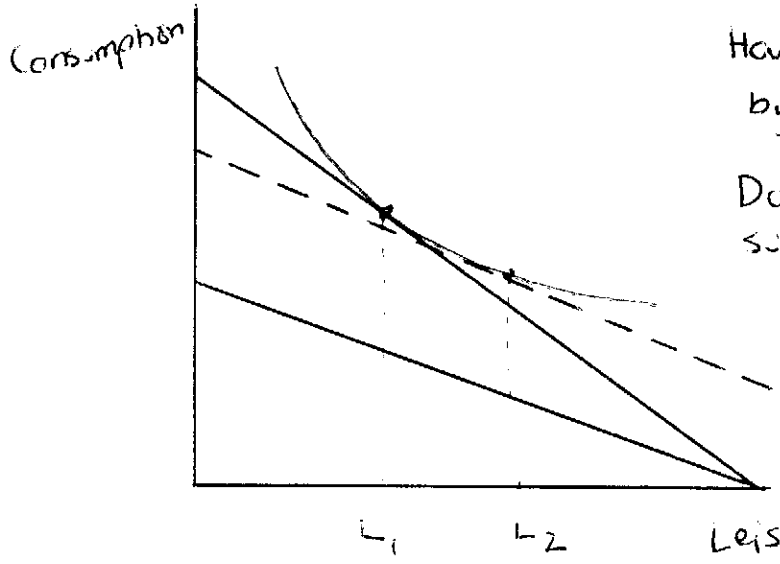
PVB = $\frac{400}{1.1} + \frac{400}{1.2} + \frac{400}{1.3}$ (3)

= 364 + 333 + 308 (2)

= 1005

PVB > PVC so yes (2)

7) The government levies a 30% wage tax on Cleopatra. It uses the money to finance a parade. The parade's value is just sufficient to make her as well off as she was before the tax was levied. On a diagram, show the effect of the government tax and expenditure package on Cleopatra's labor supply. (9 points)



Hours of work fall by $L_1 - L_2$

Dotted line reflects substitution effect.

There is no income effect because Cleopatra is compensated

8) The demand equation for hamburgers is $H = I/100 - P_f^2 - P_H$. Where P_f is the price of fries and P_H is the price of hamburgers. Fries are a normal good.

a) Are hamburgers and fries substitutes or complements? (5 points)

$P_f \uparrow \rightarrow \downarrow F$ and $\downarrow H$ (2)

∴ complements (3)

(or 5 for right answer)

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b) Are hamburgers a Giffen good? (5 points)

(5) No. $\uparrow P_h \Rightarrow \downarrow H$

c) I=500, P_f=1 and P_H=1. If the hamburger stand raises the price of hamburgers will its revenues increase, decrease, or remain the same? (10 points)

Find price elasticity of demand. (1)

$\frac{\partial H}{\partial P_H} = -1$ so elas $= -1 \cdot \frac{P_h}{H}$ (1)

Now $H = \frac{500}{100} - 1 - 1 = 3$ (2)

so elas $= -1 \cdot \frac{1}{3} = \frac{1}{3}$ (1)

$|\frac{1}{3}| < 1$ so inelastic (2)

∴ revenues will ↑ if P_h ↑ (3)

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