ECON 310
Assignment #2
Homework Quiz: Thursday, September 18

Use the following information for problems 1-3. Alice consumes goods X and Y. Alice's utility function is given by $U=X^2*Y^3$. From this equation, we know that $MUx= 2XY^3$ and $MUy= 3X^2Y^2$.

1. Suppose Alice has an income of $200, the price of X, Px = $4, and the price of Y, Py = $12.

i. Write the equation for Alice's budget line. Draw this graphically with good Y on the y-axis and good X on the x-axis. Make sure to label the intercepts.
200= 4X + 12Y, or Y= 200/12 – 1/3X

ii. What is the marginal value of X in terms of Y { $MV_{x/y}$} at her optimal bundle?
a. 1/3

iii. What is the optimal bundle of X and Y? (Hint, use two equations: the budget constraint and the relationship between the indifference curve and budget constraint at the optimal point)
EQ 1: 200 = 4X + 12Y
EQ 2: 2Y/3X= 4/12 ==➔ 24Y=12X ➔2Y=X

Putting them together: 200 = 4(2Y) + 12Y
200 = 8Y + 12Y
200 = 20 Y
10 = Y, X = 20

iv. What is Alice's utility at this point?
U= (20^2)(10^3)*

2. Suppose Alice's income falls to $100.

i. Write the equation for Alice's new budget line. Illustrate this graphically on the graph from problem 1, part i.
100 = 4X + 12Y

ii. What is the new optimal bundle of X and Y?
Only need to change budget line. So, we get
EQ 1: 100 = 4X + 12Y
EQ 2: 2Y = X
So, 100 = 4(2Y) + 12Y
100 = 20Y
5=Y, X= 10

iii. Is X a normal or inferior good?
NORMAL, income went up, x went down

iv. What is Alice's utility at this point?
U= (10^2)(5^3)*

v. Construct Alice's Engel curve for good X using these 2 levels of income.
2 points: (I,X) = (200, 20) & (100, 10)
EQ: m= 10/100 = 1/10
*20 = (1/10)*200 + B*
20 = 20 + B, so B=0
X = (1/10) I*

vi. When her income changes from $200 to $100, what is Alice's income elasticity of demand in this region?

IE=[(Xnew-Xold)/(Xold)] / [Inew-Iold/Iold]
= (10-20/20)/ (200-100/200)
=(- 10/20)/(100/200) = -.5/.5 = - 1

3. Now, suppose the price of good X increases from $4 to $8, but her income stays at the original level of $280.

i. Write the equation for Alice's new budget line. Draw this graphically on the same graph from problem 1, part i.

200= 8X + 12Y

ii. What is the new optimal bundle of X and Y?

EQ 1: 200 = 8X + 12Y
EQ 2: 2Y/3X= 8/12 ==➔ 24Y=24X ➔Y=X
200 = 8Y + 12Y
200 = 20Y
Y= 10, X = 10

iii. Is X a giffen or a non-giffen good?

Non-giffen, price went up, X went down

iv. What is Alice's utility at this point?

U= (10^2)(10^3)*

v. Construct Alice's linear demand curve for good X from these 2 points. Derive the equation and illustrate it graphically. (Note: this curve has different axes, so you will need to use a different graph than that from part i.)

2 points: (X,Px) = (20, 4) & (10, 8)
EQ: m= 4/10 = -2/5
4 = 20(-2/5) + b
4= -8 + b
B= 12
Y = (-2/5)X + 12

vi. What is Alice's price elasticity of demand for good X? Is Alice's demand elastic or inelastic?

PE=absolute value[(10-20)/(20)]/[(8-4)/4)] = abs[-.5/1] = .5 (inelastic)

4. Consider the following:

i. Can a good have both a downward sloping Engel curve and a downward sloping demand curve? Why or why not?

Downward sloping Engel curve ➔ inferior good
Downward sloping demand curve ➔non-giffen good

Can inferior good be non-giffen? Yes- when substitution effect > income effect

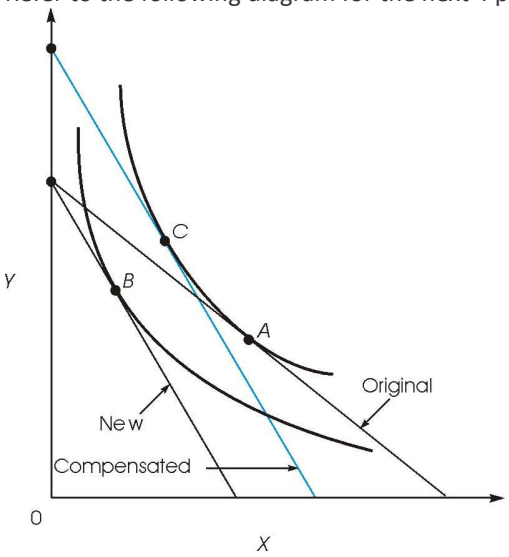
ii. Can a good have both an upward sloping Engel curve and an upward sloping demand curve? Why or why not?

Upward sloping Engel curve ➔ normal good
Upward sloping demand curve ➔giffen good

Can normal good be giffen? NO!

5. Multiple Choice (i-xi):

Refer to the following diagram for the next 4 problems



i. When the budget line shifts from the "Original" to the "New", the price of ___.

A. X increases.
B. X decreases
C. Y increases
D. Y decreases

ii. When the price change in the previous question occurs, the <u>actual</u> consumption of good X changes from ___ to ___.

A. A to B
B. A to C
C. B to C
D. C to A
E. B to A

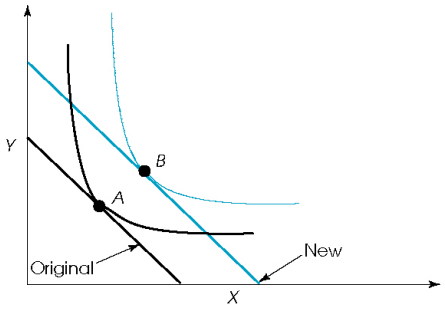
iii. The move from C to B with respect to the quantity of good X refers to the

A. Substitution Effect
B. Income Effect
C. Can't tell

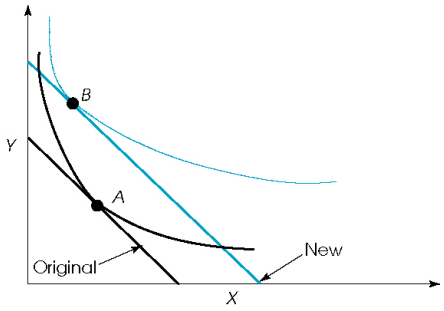
iv. In this case, X is a _____ good.

A. Giffen
B. Inferior
C. Normal
D. Leontief

Refer to the following graphs for the next two questions:



(A)



(B)

v. The good depicted in (A) is:

A. an inferior good, so the slope of the Engel curve for this good is positive
B. an inferior good, so the slope of the Engel curve for this good is negative
C. a normal good, so the slope of the Engel curve for this good is positive
D. a normal good, so the slope of the Engel curve for this good is negative

vi. The good depicted in (B) is:

A. an inferior good, so the slope of the Engel curve for this good is positive
B. an inferior good, so the slope of the Engel curve for this good is negative
C. a normal good, so the slope of the Engel curve for this good is positive
D. a normal good, so the slope of the Engel curve for this good is negative