Microeconomics I - Test #1, March 6, 2009

Var. A

1. [2.5 points]

$P_x = 4$ CZK, $P_y = 6$ CZK, $I = 48$ CZK

(a) Write down the equation of budget line with the given data

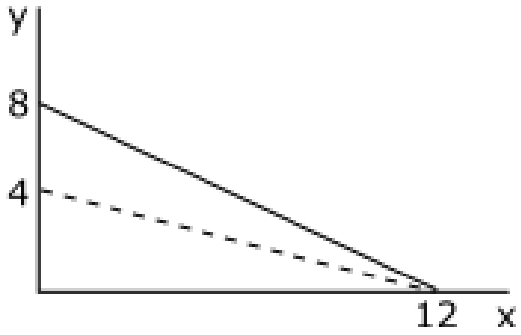
(b) Depict this on the graph; label the axis and put number to intersections with axis

(c) Depict a new budget line after change in price of y to $P_y = 12$

Solution:

(a) $P_x x + P_y y = I \quad \Rightarrow \quad 4x + 6y = 48$

(b,c)



2. [2.5 points]

$U(x, y) = x^2 y$

- Calculate marginal rate of substitution of the consumer with this utility function at point (x,y)=(1,2). Interpret the result.

Solution:

$$MRS = \frac{MU_x}{MU_y} = \frac{\partial U(x,y)/\partial x}{\partial U(x,y)/\partial y} = \frac{2xy}{x^2} = \frac{2 \cdot 1 \cdot 2}{1^2} = 4$$

This means that the consumer is willing to give up 4 units of good y in exchange for 1 more unit of x.

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Var. B

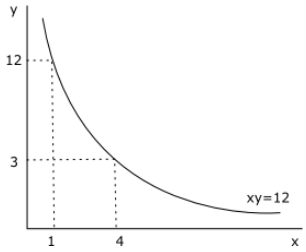
1. [2.5 points]

$U(x, y) = xy$

(a) Depict an indifference curve for utility level of 12 (find and depict at least two points and corresponding quantities of [x,y])

(b) Calculate the marginal rate of substitution in one of these points

Solution:



$$MRS = \frac{MU_x}{MU_y} = \frac{\partial U(x,y)/\partial x}{\partial U(x,y)/\partial y} = \frac{y}{x} = (\text{in point } (4,3)) = \frac{3}{4}$$

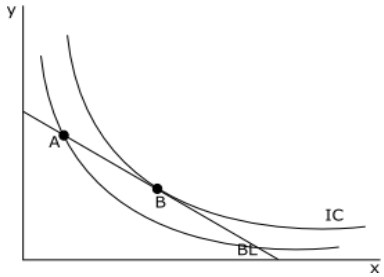
This means that the consumer is willing to give up 3/4 units of good y in exchange for 1 more unit of x.

2. [2.5 point]

On the picture below we see Tom's budget line and his indifference curves. Tom's endowment point is point A.

(a) Would Tom like to switch to point B if he has this chance?

(b) Is point A point of Tom's optimum? (Describe either formally or intuitively).



Solution:

(a) Yes, because point B lies on a higher indifference curve than point A.

(b) No, point B is optimum, because there $MRS = \frac{p_x}{p_y}$, i.e, indifference curve is tangent to the budget line.

Var. C

Name: .....

1. [2.5 points]

$U(x, y) = xy$

P_x=5

P_y=3

I=60

- Calculate optimum of consumer (amount of x and y)

Solution:

$$\text{optimality: } MRS = \frac{MU_x}{MU_y} = \frac{P_x}{P_y} \quad \Rightarrow \quad \frac{y}{x} = \frac{5}{3} \quad \Rightarrow \quad 5x - 3y = 0$$

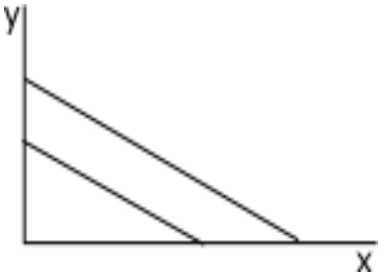
$$\text{budget: } 5x + 3y = 60$$

Solving this system of equations we get that $x = 6$ and $y = 10$.

2. [2.5 points]

Assume that Helen consumes only two goods x and y. For her, these goods are **perfect substitutes**. Draw several indifference curves in a graph with x on horizontal and y on vertical axis. What can you say about Helen's marginal rate of substitution?

Solution: Helen's marginal rate of substitution is constant (because x and y are substitutes).



Var. D

Name: .....

1. [2.5 points]

$U(x, y) = 2x + y$

- Calculate marginal rate of substitution of the consumer with this utility function. Interpret the result.

Solution:

$$MRS = \frac{MU_x}{MU_y} = \frac{2}{1} = 2$$

MRS is constant, i.e. goods x and y are perfect substitutes, i.e. consumer is willing to exchange x and y at a constant rate: $2y$ for $1x$.

2. [2.5 points]

$P_x = 4$ CZK, $P_y = 6$ CZK, $I = 48$ CZK

(a) Write down the equation of budget line with the given data

(b) Depict this on the graph; label the axis and put number to intersections with axis

(c) Depict a new budget line after change in income to $I = 24$

Solution:

(a) $P_x x + P_y y = I \quad \Rightarrow \quad 4x + 6y = 48$

(b,c)