CATÓLICA LISBON
SCHOOL OF BUSINESS & ECONOMICS

UNIVERSIDADE CATÓLICA PORTUGUESA

Microeconomics I

1st Mini-test — Year 2012/2013

Name: Student number: Class:

Mateus is a teenager who loves to go to the movie theater on Sundays. To properly enjoy the movies, Mateus also needs to eat popcorns. His utility function is $U(x, y) = min\{x; 2y\}$, where x is the number of movies and y the number of popcorn bags. Each time Mateus goes to the movie theater, his mother gives him €24. The price of each movie is €5 and the price of each popcorn bag is €2.

a) Determine the optimal choice of Mateus and represent it graphically.
b) Determine the demand functions.

Mateus' mother imposes that we only spend 4,5 hours in the movie theater each Sunday and each movie lasts for 1,5 hours.

c) Considering all the contraints, what is going to be Mateus' new choice? Represent it graphically.

<u>Solutions:</u>

a)

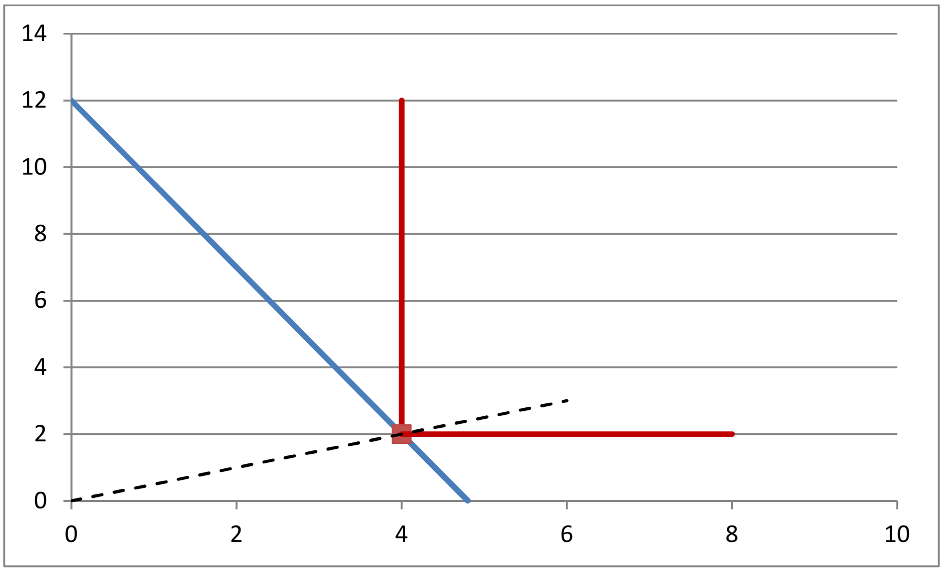
$Max\ U(x,y) = min\{x; 2y\}$
$s.t: M = P_x x + P_y y$

$$\begin{cases} x = 2y \\ M = P_x x + P_y y \end{cases} \Leftrightarrow \begin{cases} - \\ M = P_x \times (2y) + P_y y \end{cases} \Leftrightarrow \begin{cases} x^* = \frac{2M}{2P_x+P_y} \\ y^* = \frac{M}{2P_x+P_y} \end{cases}$$

Substituting $P_x = 5, P_y = 2$ and $M = 24$ in the demand function computed above we will have the following optimal solution:

$$\begin{cases} x^* = 4 \\ y^* = 2 \end{cases}$$

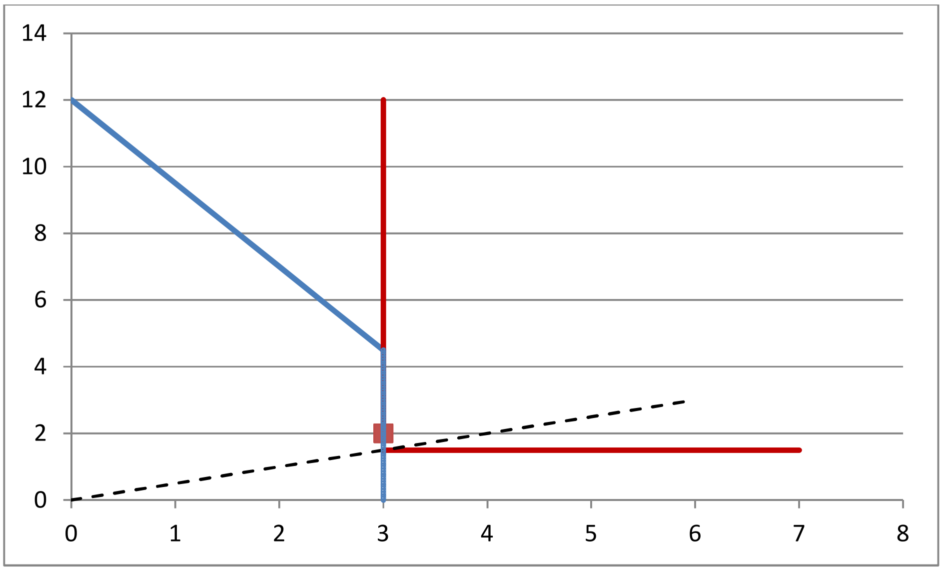
Graphically we have:



b) From the previous question we have the following demand functions: $y^* = \frac{M}{P_y+2P_x}$ and $x^* = \frac{2M}{P_y+2P_x}$.

c) With the time constraint imposed by Matheus´ mother he can only see a maximum of 3 movies $\left({}^{4,5}/_{1,5} = 3\right)$.

By analyzing the graph below we see that the optimal condition is an interval.



So the new optimal choices are going to begin in the intersection point between the efficiency line and the new time restriction.

$$\begin{cases} x^* = 3 \\ x = 2y \end{cases} \Leftrightarrow \begin{cases} x^* = 3 \\ y^* = 1{,}5 \end{cases}$$

The new optimal choices are going to end in intersection between the budget constraint and the new time restriction.

$$\begin{cases} x^* = 3 \\ M = P_x x + P_y y \end{cases} \Leftrightarrow \begin{cases} x^* = 3 \\ 24 = 5 \times 3 + 2y \end{cases} \Leftrightarrow \begin{cases} x^* = 3 \\ y^* = 4{,}5 \end{cases}$$

Therefore the new optimal choice is such that $x^* = 3$ and $y^* \in [1{,}5; 4{,}5]$, because all the points in this interval provide the same utility and are along the active restriction.