Problem Set II: budget set, convexity, demand

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Exercises will be solved in class on *January 25th, 2010*

1. MWG 2.D.2: building consumption and budget sets

A consumer consumes one consumption good x and hours of leisure h. The price of the consumption good is p, and the consumer can work at a wage rate of $s = 1$. What is the consumption set X? What is the consumer Walrasian Budget set? Write them down analytically and draw geometrically in $\mathbb{R}^2_+$.

2. MWG 2.D.4 (with changes): convexity consumption and budget sets

A consumer consumes one consumption good x and hours of leisure h. The price of the consumption good is p. The consumer can work at a wage rate of $s = 1$ for 8 hours, and at wage $s' > s$ for extra time; however, he can work only up to 14 hours a day.

Draw the budget set in $\mathbb{R}^2_+$ [*Hint: it's very similar to the one on MWG*] and derive an analytical expression for it; then show both graphically and analytically that the budget set you drew and derived is not convex.

3. MWG 2.E.1.

Suppose $L = 3$ and consider the demand function $x(p, w)$ defined by:

$$x_1(p,w) = \frac{p_2}{p_1 + p_2 + p_3}\frac{w}{p_1}, \;\; x_2(p,w) = \frac{p_3}{p_1 + p_2 + p_3}\frac{w}{p_2}, \;\; x_3(p,w) = \frac{\beta p_1}{p_1 + p_2 + p_3}\frac{w}{p_3}.$$

Dos this demand function satisfy homogeneity of degree zero and Walras' law when $\beta = 1$? What about when $\beta \in (0, 1)$?

***Added magic*. MWG 2.E.4: demand, Engel functions**

Show that if $x(p, w)$ is homogeneous of degree one with respect to w, i.e. $x(p, \alpha w) = \alpha x(p, w)$ for all $\alpha > 0$, and satisfies Walras' law, then $\varepsilon_{lw}(p, w) = 1$ for every l. Interpret. Can you say something about $D_x x(p, w)$ and the form of the Engel functions and curves in this case?