MICROECONOMICS I

Practice sheet 1. **Academic year 2012-2013**

1 Preferences and Utility Functions

1.1. Construct an indifference curve map which represents complete, reflexive and transitive preferences in the following cases:

1. One of the two goods is a "bad".
2. The consumer gets satiated of one product but not of the other.
3. The consumer gets satiated of both products.
4. Each of the goods becomes a "bad" from some conssumption onwards.

1.2.a. Graph the following preference orders:

1. I can‘t stand butter or mermelade by themselves, but I like butter and mermelade sandwiches.
2. x_1 and x_2 are substitutes: whenever x_1, I do not mind to have half of x_2.
3. I do not mind whether it is Heineken or San Miguel, as long as it is beer!
4. Red or blue matches, with the same flaiming capacities.
5. Right or left shoes of the same size, quality, design, etc.

1.2.b. For all the previous exercises, indicate whether preferences are regular or not. In case they are not, indicate which it is the property not being fulfilled. In case they are, indicate whether there is strict or weaj convexity and monotonicity.

1.3. If given consumption bundles x and y it so happns that x is at least as preferred as y and, at the same time, y is at least as preferred as x, we then say that x and y leave the consumer *indifferent*. We denote such relationship as $x \backsim y$.

1. Assume $x \backsim y$. Write the indifference relationship in terms of $\succsim$.

2. $\succsim$ is defined as being *reflexive* if given any conssumption combination x it is always true that $x \succsim x$. Explain why and write it terms of $\backsim$.

3. Are indifference relations *reflexive*?

1.4 $\succsim$ is *transitive* when: if $x \succsim y$ and $y \succsim z$, then $x \succsim z$. Is the indifference relation *transitive*? If it is, write it in terms of $\backsim$. Do the same exercise for $\succ$,the strict preference relation.

1.5. Draw maps of indifference curves for the following utility functions:

1. $u(x_1, x_2) = (x_1 + x_2)^2$.

2. $u(x_1, x_2) = x_1 + x_2$.

3. $u(x_1, x_2) = \alpha x_1 + \beta x_2$ where $\alpha, \beta > 0$.

4. $u(x_1, x_2) = \ln x_1 + x_2$.

5. $u(x_1, x_2) = \min\{x_1, x_2\}$.

6. $u(x_1, x_2) = \min\{\alpha x_1, \beta x_2\}$ where $\alpha, \beta > 0$.

7. $u(x_1, x_2) = x_1$.

8. $u(x_1, x_2) = x_1^\alpha x_2^{1-\alpha}$, where $0 < \alpha < 1$.

1.6. Consider a set X of conssumption combinations and a utility function $u : X \to \mathbb{R}$, associating to each conssumption x a utility level $u(x)$. Assume f is a increasing function. Consider the utility function $f \circ u$, associating to each conssumption combination x a utility level $f(u(x))$. In such case, we way that $f \circ u$ is a monotne transformation of u. Show that u and $f \circ u$ represent the same preferences. Use this property to corroborate the following:

1. $u(x_1,\, x_2) = \sqrt{x_1} + x_2$ and $v(x_1,\, x_2) = \ln(x_1) + x_2$ represent the same preferences.

2. $u(x_1,\, x_2) = {x_1}^2 x_2$ and $v(x_1,\, x_2) = 2\ln(x_1) + \ln(x_2)$ represent the same preferences.

1.7. X is a convex set if for any two components x, $y \in X$ it is true that $tx + (1-t)y$ also belongs to the set X for any $t \in [0, 1]$. Assuem a set X of conssumption combinations. A preference relation $\succsim$ is convexif for any $y \in X$, the set $\{x : x \succsim y\}$ is convex. Graph a map of convex preferences. Represent such preferences with some examples of utility functions.

2 The budget constraint

2.1. Assume there are only two goods. A consumer with income $m > 0$ observes prices p_1 and p_2. Write the budget set and the budget line. Draw both.

2.2. A consumer with income $m = 10$ observes prices $p_1 = 2$ and $p_2 = 1$.

1. Write and draw the budget set and the bidget line.
2. Check whether (2, 2) is an available conssumption bundle, whether (3, 4) would make the consumer spend all her income and whether (4, 5) is available. Use also a graph.
3. The govenment deices there is a limit of 6 units in the conssumption of good 2. Draw the new budget set.

2.3. A consumer has 40 monetary units of income to spend in two goods. Assume $p_1 = 2$ and $p_2 = 8$. The government provides a subsidy of one monetary unit to all units of good 1 exceeding $x_1 = 8$.

1. Calculate and draw the budget constraint.
2. Does this subsidy increae consumer's welfare?

2.4. A consumer has income $m = 100$.

1. Calculate and graph the budget constraint at prices $p_1 = 10$ and $p_2 = 20$.
2. Assume there is a 10% tax on the price of good 1. Repeat the exercise.
3. Assume there is a 10% tax on the price of both goods. Repeat the exercise.

4. Using the initial data. in which percentage would income have to decrease in order to have the same result as in the previous exercise?

2.5. A consumer with 20 million montary units spends her income in buying a house (good 1) and other goods (good 2). Assume $p_1 = p_2 = 1$, calculate and draw the budget constraint for the following cases.

1. No subsidies.
2. A 40% subsidy in the price of housing, with a limit of 10 million in the total amount of subsidy given.
3. A house will be completely subsidized until reaching a cost of 10 million. Any excess of top of that will be paid by consumers at market prices.

2.6. Show that the budget set is always convex.