NAME:

STUDENT NUMBER:

ECO 3153
Winter 2012
Louis-Philippe Morin

Midterm 1
February 3rd, 2012

Instructions:

1. All questions should be answered on the questionnaire. Use the back of the pages as scrap paper.

2. Only non-programmable calculators are permitted during this exam.

3. The marks for each question are given in bold following the question. Budget your time accordingly.

4. The maximum grade is **100**.

5. This exam consists of **10** pages and **4** questions. It is your responsibility to ensure that your exam questionnaire is complete.

6. Good luck!

Question 1

a) List all the axioms imposed on consumer preferences (and on the utility function) when solving the standard utility maximization (or expenditure minimization) problem. **7 points**.

b) State two consequences of imposing local non-satiation (or greed) on the shape of the indifference curve. **4 points**.

c) Let $\tilde{U}(\mathbf{x}) = \phi(U(\mathbf{x}))$ where ϕ is a differentiable monotonic transformation. Show that the marginal of substitution of good i for good j (MRS_{ij}) will be the same regarless of whether you use $\tilde{U}(\mathbf{x})$ or $U(\mathbf{x})$ to compute it. **4 points**.

d) For the following situation argue 1) whether the WARP is violated or not. and 2) which (if any) bundle is revealed preferred to the other one. Assume that Susan has an income of 53. **5 points**.

Susan can consume 4 goods: liquid paper, timbits, french fries, and cola. On day one Susan faces prices $p_l^1 = 2$, $p_t^1 = 1$, $p_f^1 = 4$ and $p_c^1 = 1$. She consumes $x_l^1 = 4$, $x_t^1 = 8$, $x_f^1 = 8$, and $x_c^1 = 5$. On day two she faces prices $p_l^2 = 0.5$, $p_t^2 = 0.8$, $p_f^2 = 5$ and $p_c^2 = 0.5$, and consumes $x_l^2 = 4$, $x_t^2 = 5$, $x_f^2 = 9$, and $x_c^2 = 4$.

Question 2

a) Show that

$$\frac{\partial H^i(p,v)}{\partial p_j} = \frac{\partial H^j(p,v)}{\partial p_i}$$

10 points.

b) Show, using the equations and the notation used in class, that the total change in the demand for good i following an increase in the price for good j (i.e. $\partial D^i(p,y)/\partial p_j$) can be decomposed into a substitution effect and an income effect. **10 points**

Question 3

Let a consumer's indirect utility function be

$$V(p, y) = \sum_{i=1}^{n} \ln\left(\frac{y}{np_i}\right)$$

where y is the consumer's fixed income.

a) What would be the value of the Lagrange multiplier $(\mu^*(p, y))$ if you were to solve this utility maximization problem? **5 points**.

b) What is the expenditure function $C(p, v)$? **5 points**.

c) What is the Marshallian demand function for good i? **10 points**.

Question 4

Imagine a consumer with preferences that can be represented by the following utility function:

$$U(x) = -\sum_{i=1}^{n} 1/x_i$$

Assume that the consumer want to maximize her utility and that she has a fixed income y.

a) If p_i represents the price of good i, write down the budget constraint. **5 points**.

b) Briefly explain why we should expect an interior solution. **5 points**.

c) Show that the the Marshallian demand function for good j is (assuming an interior solution)

$$D^j(p, y) = \frac{y}{\sqrt{p_j}\sum_{i=1}^{n}\sqrt{p_i}}$$

10 points.

d) Verify that these Marshallian demand functions are homogeneous of degree 0 in all prices and income. **5 points**.

e) Compute the indirect utility function. **5 points**.

f) Compute the Hicksian demand functions for each good. **10 points**.