NAME:

STUDENT NUMBER:

ECO 3153
Winter 2013
Louis-Philippe Morin

Midterm 1
February 7^{th}, 2013

Instructions:

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

2. Calculators are **not** 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 **11** pages and **4** questions. It is your responsibility to ensure that your exam questionnaire is complete.

6. Good luck!

Question 1	/25
Question 2	/15
Question 3	/40
Question 4	/20
Total	/100

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) True or false? One of the axioms seen in class states that $U(\mathbf{x}) > U(\mathbf{x}')$ if and only if $\mathbf{x} > \mathbf{x}'$. Explain. **5 points**.

c) If the _______________ and the ________________ axioms hold, then the person is said to have rational preferences. **4 points**.

d) I regard one pint of milk and one pint of tomatoe juice as of equal utility; and one pint of either is strictly preferable to 1/2 pint of both. Based on this information, do my preferences satisfy the 'strict quasiconcavity' axiom? Explain your answer with the help of a graph. **4 points**.

e) We saw that preferences that can be described by a utility function like $U(x) = \prod_{i=1}^{n} x_i^{\alpha_i}$, can also be represented by $\hat{U}(x) = \sum_{i=1}^{n} \alpha_i \ln x_i$. Can it also be represented by $\tilde{U}(x) = \sum_{i=1}^{n} \alpha_i \ln(x_i + 1)$? Why? **5 points**.

Question 2

Let a consumer's expenditure (or cost) function be

$$C(p,v) = \left[\sum_{i=1}^{n} p_i^{\frac{\alpha}{\alpha-1}}\right]^{\frac{\alpha-1}{\alpha}} v$$

where v is some level of utility.

a) What is the indirect utility function $V(p,y)$? **5 points**.

b) What is the degree of homogeneity in prices of the above cost function here? Prove it. **5 points**.

c) What is the Hicksian demand function for good j ($H^j(p, v)$)? **5 points**.

Question 3

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

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

Assume that the consumer wants to minimize her expenditure in order to reach a fixed level of utility v.

a) If p_i represents the price of good i, write the Lagrangean equation for the consumer's optimization problem. **5 points**.

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

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

$$H^j(p,v) = -\frac{\sum_{i=1}^{n}\sqrt{p_i}}{v\sqrt{p_j}}$$

10 points.

d) Verify that the Hicksian demand function is homogeneous of degree 0 in prices. **5 points**.

e) Compute the cost function. **5 points**.

f) Compute the Marshallian demand function for good j. **10 points**.

Question 4

a) Generally speaking, what is the degree of homogeneity in prices of the cost function $C(\mathbf{p}, v)$? Use a mathematical proof to support your answer starting with the Lagrangean equation of the cost-minimization problem. **10 points**.

b) Show, using the notation used in class and the properties of the cost function, that the compensated own-price effect is nonpositive. **10 points**