PhD Program in Transportation
Transport Demand Modeling
Written Exam
16th of January 2012

Notes:
The total duration 2h00m; each question should be answered in a different paper sheet
The questions are to be answered without any type of consultation; there is no need for a calculation machine

1) Heterocedasticity is quite important in Linear Regression Models.

   a) Explain its concept and what the consequences for explanatory and predictive analysis are. (2,0 points)

   b) How can you detect the presence of heteroscedasticity when performing MLR. Refer more than one method. (2,0 points)

2) What are the two main types of uses for factor analysis? Describe them and explain their differences. (2,0 points)

3) Please, answer the following questions about Generalized Linear models:

   a) Please explain the main differences between Generalized Linear Model and General Linear Models, stressing the applicability of both modeling approaches with examples. Please refer the main aspects of the theoretical formulation of the Generalized Linear Models. (2,0 points)

   b) Explain how the suitability of Poisson and Negative Binomial formulations can be tested to model count data phenomena. Please refer the main characteristics of each link distribution and how this might influence the quality of the estimated models. (2,0 points)

4) Distinguish a Spatial Lag Model from a Spatial Error Model.

   a) Describe the two models and all its main components. (2,0 points)

   b) Describe the estimation process of a lag model. (2,0 points)

5) Marginal effects are often used in ordered response models to evaluate the influence of independent variables. Although sometimes they could be misleading or inappropriate. When does that happen and what are the remedies for these situations? (2,0 points)

6) The multinomial logit (MNL) model is built under the assumption that the error components of the utility are IID which introduces a limitation on the application of this model.

   a) Name this limitation and explain it through its mathematical proof. (2,0 points)

b) A model that tries to avoid this limitation in the nested logit (NL) model. Explain how this is done comparing the MNL and the NL in terms of their mathematical structure. (2,0 points)