Econ 772
Homework 6
Method of Moments and MLE

1) Consider the model

$$y_{ij}^* = X_i \beta_j + u_{ij}, \quad j = 1, 2, .., J; i = 1, 2, .., I$$

with

$$F(u_{ij}) = \exp\left\{-e^{-u_{ij}}\right\}.$$

The econometrician does not observe y_{ij}^*; instead she observes

$$y_{ij} = 1\left(y_{ij}^* = \max_k y_{ik}^*\right);$$

she observes which choice j is the best.

a) Find $\Pr[y_{ij} = 1 \mid X_i]$.

b) Find a MLE for β.

c) Find a MOM estimator for β.

2) Consider a model where there is a distribution of prices $F(\cdot)$ for bananas. Assume consumer i purchases a banana if he encounters a price $p < r_i$ where r_i satisfies

$$G(r_i, X_i) = 0.$$

Given a random sample of accepted banana prices and personal characteristics $\{p_i, X_i\}_{i=1}^n$, show how you can estimate parameters implicit in $F(\cdot)$ and $G(\cdot, \cdot)$. What reasonable identifying assumptions might you have to make?

3) Let

$$\begin{aligned} y &= X\beta + Z\gamma + u, \\ u &\sim \left(0, \sigma^2 I\right). \end{aligned}$$

Note that it was not assumed that the errors were normal. Consider

$$H_0 : \gamma = 0 \quad \text{vs } H_A : \gamma \neq 0.$$

Suggest a LM-like test, i.e. one that requires estimation of only the restricted model to test the null hypothesis.