Assignment 1

To be completed by September 6th, 3pm

1. Consider a multinomial logit model where the utility for choosing the jth option is $U_{ij} = X_i\beta_j + \epsilon_{ij}$ with the utility of option 0 is zero. Show that expected utility of the best choice is given by:

$$E(V_i) = \ln\left(\sum_j \exp(X_i\beta_j)\right) + \gamma$$

where γ is Euler's constant.

2. For this problem use `dataassign1.mat` which has data on the choices (the Y's) and data on the regressors (the X_1's, the X_2's, and Z's). The X_1 and X_2 variables are individual-level characteristics so the coefficients on these variables need to vary by choice. Each of the columns of the Z variable refer to a choice-specific attribute and hence the coefficient on this variable is common across the choices. Using Matlab[1] (Gauss, C, Fortran, and R are also acceptable– Stata is not), estimate the following:

   (a) a multinomial logit model with X_1 and Z as the regressors

   (b) a nested logit model with the same regressors as in a) with $Y = 1$ and $Y = 2$ in one nest and $Y = 0$ in the other

   (c) a multinomial logit model with X_1, X_2, and Z as the regressors

   (d) a nested logit model with the same regressors as in c) where $Y = 1$ and $Y = 2$ in one nest and $Y = 0$ in the other

3. Use `dataasign2.mat` to estimate models of the BST framework. X_1 and Z match the descriptions in 2). For the overlapping nests, one nest has $\{1, 2\}$ and $\{3, 4\}$ while the other has $\{1, 3\}$ and $\{2, 4\}$. All utilities are normalized with respect to choice 0.

[1] If you use Matlab, use fminunc for unconstrained minimization