Exercise 5 (Team Exercise, 14 Points) **Leigh Tesfatsion**
DUE: Tuesday, March 10, 11:00am **Econ 308, Spring 2009**

**** PLEASE NOTE: NO LATE ASSIGNMENTS WILL BE ACCEPTED - NO EXCEPTIONS!**

Zero Intelligence (ZI) Market Trading Exercise: REPASTJ/JAVA VERSION

Basic References:

1 ** DA-MAOS (RepastJ/Java, open source), a double-auction market platform with heterogeneously learning traders, including a zero-intelligence trader option, by Nanpeng Yu (ISU ECpE PhD Candidate) and Ian Guffy (ISU Comp Sci), who took Econ 308 in S07.
http://www.econ.iastate.edu/tesfatsi/demos/DAMAOS/DAMAOSHomePage.htm

2 ** Mark McBride's Zero-Intelligence (ZI) Trading Demo (Java Applet/NetLogo Model)
http://mcbridme.sba.muohio.edu/ace/labs/zitrade/zitradenetlogo.html

3 ** Dhananjay K. Gode and Shyam Sunder, **"Allocative Efficiency of Markets with Zero-Intelligence Traders: Markets as a Partial Substitute for Individual Rationality"**, *Journal of Political Economy*, Vol. 101, No. 1, 1993, 119-137.
http://www.econ.iastate.edu/tesfatsi/Gode and Sunder-JPE.pdf
(Caution:Large Download, 1.4MB)

3 * S. Railsback, S. Lytinen, and S. Jackson, **StupidModel: A Template Model for ABM Platforms**, http://condor.depaul.edu/∼slytinen/abm/StupidModel/

5 * L. Tesfatsion, **Repast: A Software Toolkit for Agent-Bsed Social Science Modeling**, Self-Study Guide for Java-Based Repast (RepastJ). Includes pointers to general Java programming resources as well as to RepastJ resources.
http://www.econ.iastate.edu/tesfatsi/repastsg.htm

EXERCISE OVERVIEW:

As detailed at the DA-MAOS homepage [1], the DA-MAOS demo models traders interacting in a double auction. The traders can be represented either as "budget-constrained zero intelligence" (ZI-C) traders as in Ref.[2] and Ref.[3], or as traders having various forms of learning capabilities.

The traders can participate in two distinct types of double auctions: uniform-price double auctions; and disriminatory-price k-double auctions in which the price for a matched buyer and seller is set between the buyer's ask price and the seller's bid price as determined by the user-specified value for k in [0,1].

This exercise concentrates on the DA-MAOS ZI-C options. In a subsequent assignment you will be asked to make use of the DA-MAOS demo to develop and analyze experiments that compare outcomes with ZI traders against outcomes when traders have some learning capabilities.

EXERCISE DETAILS:

Part A: (5 Points) Using instructions on the DA-MAOS homepage [1], download and set up DA-MAOS as a Java project, ideally within some Java integrated development environment (IDE) such as Eclipse, NetBeans, or JBuilder Foundation (all freely available for downloading). Acquaint yourself with the various DA-MAOS ZI-C options. Then check to see whether you can get DA-MAOS to compile and run with ZI-C traders in a discriminatory-price k-double auction with various settings for k, bid/offer prices (purchase/sale reservation values), Max Reservation Value, and Domain Size options. Carefully report the steps you took to do Part A.

NOTE: If you find that coding changes appear to be necessary to get DA-MAOS to properly compile and run ZI-C experiments, explain carefully what coding changes you have made. The point here is to make MINIMAL (and if possible no) changes in the DA-MAOS code for Part A.

Part B: (3 Points) Using information provided at the DA-MAOS homepage [1], provide a careful flow diagram detailing the logical flow of events in the test-case ZI-C experiments that you conducted in Part A. In particular, describe carefully the type(s) of output currently generated for each run, and the form(s) in which this output is displayed.

Part C: (3 Points) Use flow diagrams to compare and contrast the ZI-C flow of events for DA-MAOS in Part B with the ZI-C flow of events for the McBride NetLogo ZI Trading Demo in Ref.[2] and the ZI-C flow of events for the Gode-Sunder experimental set-up in Ref.[3]. The needed information to build the required flow chart for the McBride demo should be obtainable from the McBride demo homepage [2].

Part D: (3 Points) Although the developers of DA-MAOS have conducted numerous test experiments in an attempt to verify the DA-MAOS code, the DA-MAOS demo must still be considered in beta development since there are so many options to test. Devise some experiments that can be conducted using the DA-MAOS ZI-C options to provide tests of the code, using one or both of the following options:

- **Option 1:** Devise highly simplified ZI-C test cases for which outcomes can clearly be predicted in advance. Then use DA-MAOS to see if these outcomes are indeed generated.

- **Option 2:** Conduct experiments with the DA-MAOS ZI-C options that should qualitatively replicate the outcomes generated by the McBride NetLogo ZI Trading Demo and/or the experimental findings reported in Ref.[3].

Using either or both of these options, are you able to qualitatively replicate results and hence increase confidence in the DA-MAOS code? Or do you get significantly different results, suggesting possible bugs? Explain carefully.

NOTE: Any improvements to DA-MAOS resulting from your work will be acknowledged in full at the DA-MAOS homepage [1].