Homework 2 (Individual, 22 Points Total) **Leigh Tesfatsion**
DATE: Wednesday, September 7, 11:00am **EE/Econ 458, Fall 2011**

Important Note: Late assignments will not be accepted – no exceptions.

HOMEWORK 2

Please answer **ALL FIVE PARTS A-F** of this exercise. General instructions for this exercise are as follows:

(a) Use this packet for all of your answers. In particular, the **blank graphs** provided below for Parts A through D should be used to provide the requested graphical answers **in clear carefully labeled form**. This includes labels for axis variables as well as labels that carefully identify what is being graphed.

(b) Be sure to show all your work so that partial credit can be given for answers even if some type of error occurs along the way.

(c) Read each question part carefully before you begin your answer.

(d) Define terms and concepts clearly and carefully.

(e) Be sure to make an extra copy of your answer packet for use in class discussion on the due date. Individuals will be called upon to report their findings.

Consider an hourly electric wholesale power market conducted for a particular hour H of a particular day D. For simplicity, assume there are no binding transmission constraints.

The traders participating in this market consist of three profit-seeking sellers (generation companies), labeled S1, S2, and S3, and two profit-seeking buyers (load-serving entities) labeled B1 and B2. Each seller is trying to sell power (MW), and each seller has a successively higher reservation price ($/MWh) for each MW of power it sells. Each buyer is trying to buy power, and each buyer has a successively lower reservation price ($/MWh) for each MW of power it buys. The objective of each seller and buyer is to maximize the net surplus it extracts from the market by means of its power trades.

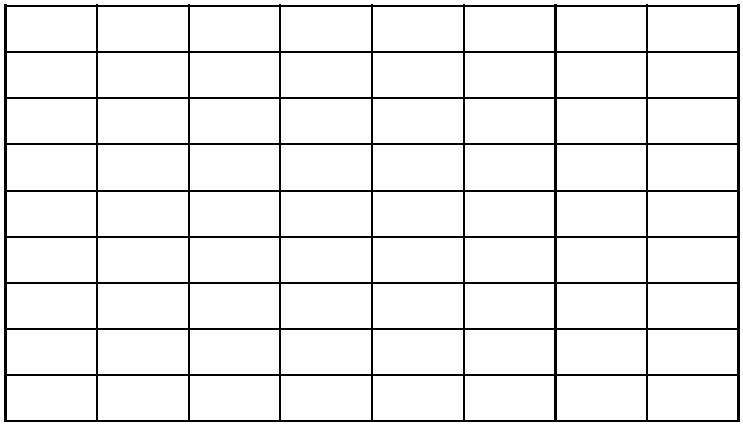
Table 1, below, presents the specific reservation prices ($/MWh) for sellers and buyers for each successive MW of power they sell and buy, respectively.

Table 1: Power Reservation Prices for Sellers and Buyers

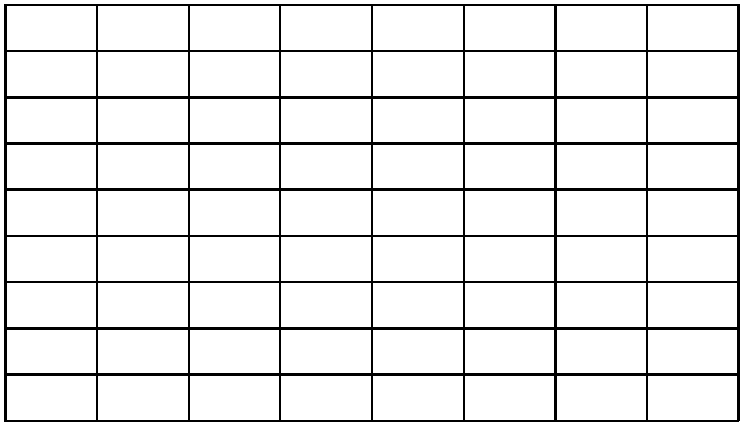
	Reservation Prices ($/MWh)				
Power (MW)	S1	S2	S3	B1	B2
1	10.00	10.00	50.00	80.00	80.00
2	50.00	40.00	70.00	70.00	70.00
3	80.00	∞	90.00	30.00	60.00
4	∞	∞	∞	0	40.00
5	∞	∞	∞	0	30.00
6	∞	∞	∞	0	0

Part A (3 Points) Using the information in Table 1, calculate and graphically depict below the **True Total Supply Schedule** for this power market.

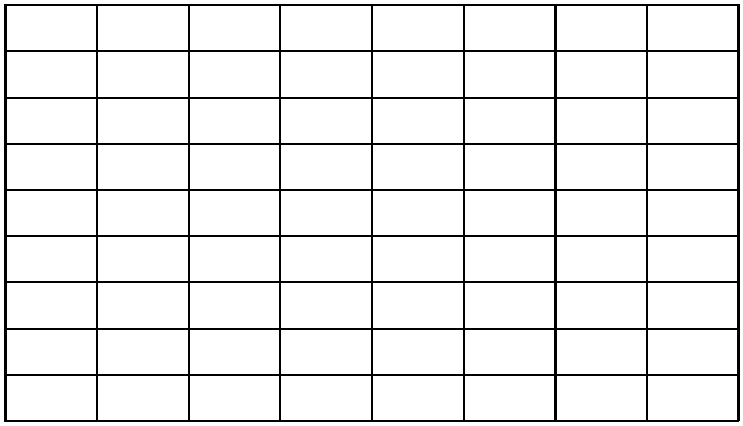
Part B (3 Points) Using the information in Table 1, calculate and graphically depict below the **True Total Demand Schedule** for this power market.



Part C (3 Points) Using your Part A and Part B findings, calculate and graphically depict below all possible **Competitive Market Clearing (CMC) Points** for this power market.



Part D: (4 Points) Using your Part A through Part C findings, calculate and report here the dollar amounts for **Total Net Seller Surplus (TNSS)** and **Total Net Buyer Surplus (TNBS)** at any CMC point for this power market: TNSS _____; TNBS _____. Also, graphically depict below these two net surplus amounts TNSS and TNBS.



Part E (4 Points Total)

E.1 (1 Point) Define in words what is meant by **Total Net Surplus** for this power market.

E.2 (3 Points) Explain carefully *why* the Total Net Surplus extracted at any CMC point for this power market is as large as it can possibly be. That is, explain why the Total Net Surplus extracted at any point *other* than a CMC point *cannot* be stricly larger than the Total Net Surplus extracted at a CMC point.

Part F (5 Points)

Suppose the power market for hour H of day D depicted in Table 1 is conducted through an independent system operator (ISO), as follows:

- The sellers and buyers report individual supply and demand schedules to the ISO;
- The ISO then sets the market price at what the ISO believes to be a CMC price level *based on these reported individual supply and demand schedules*;
- If the ISO perceives that multiple possible CMC price levels exist, the ISO sets the market price at the *midpoint* of the range of perceived possible CMC price levels;
- The maximum possible number of MWs are then sold at the market price set by the ISO.

Based on your findings for Part A through Part E, above, is there any way that **seller S2** in Table 1 can secure a higher net seller surplus for itself (relative to its net seller surplus outcome under CMC) by reporting to the ISO an individual supply schedule that **deviates** from its true individual supply schedule, *assuming **all other** sellers and buyers in Table 1 report their true individual supply and demand schedules to the ISO?*

If your answer is YES, then use the space below and the back of this page and/or an extra attached sheet (if necessary) to do the following:

1. Determine and describe the individual supply schedule that seller S2 should report to the ISO to attain the highest possible net seller surplus for itself, assuming that other sellers and buyers report their *true* individual supply and demand schedules.
2. Provide careful verbal and graphical arguments to support your assertion that this individual supply schedule provides the highest net seller surplus for seller S2.

If your answer is NO, carefully explain *why* S2 would attain its highest possible net seller surplus by reporting to the ISO its *true* individual supply curve, *assuming **all other** sellers and buyers in Table 1 report their true individual supply and demand schedules to the ISO.*