Deterministic Math Models (550.251)
Case II (Due Thursday, April 17, 2008)

General Directions: You must show all work and document any assumptions to receive full credit. As always, when creating a mathematical model, clearly define your variables and label your objective function and constraints. Feel free to use Excel Solver.

You MUST work in a group of size 2-3.

Other Guidelines:

(a) Review the handout "Reports and Memos" available on the course website.

(b) Prepare a TYPED memo/executive summary/report that answers the questions stated in the case description.

(c) Provide appendices to present your mathematical model and the Excel Solver output (if any) used to justify the answers given in the report.

CASE DESCRIPTION:

Golden West Homes (GWH) manufactures mobile homes. The company purchases ovens from the Swiss Maid Appliance Company. The estimated cost to place an order is \$800, and GWH estimates a weekly holding cost of \$2 per oven. The purchase cost per oven is \$430. Requirements for ovens over a 10 week planning period are as follows:

Week	1	2	3	4	5	6	7	8	9	10
Demand	130	160	60	50	40	80	120	140	70	150

In the past GWH has used a fixed order quantity of 150 units. Based upon this policy (called AS-IS), create a graph of the inventory level for the next 10 weeks assuming that there are 150 units in inventory at the start of week 1. What is the cost of this policy for the next 10 weeks? How many times will GWH place an order if this policy is used?

Last month, GWH hired a team of management science analysts. One of their first projects was to analyze the company's inventory policies. The analysts suggested the following approach (Alternative I):

1. Compute the average weekly demand based on the 10 weeks of data given above.
2. Determine the optimal order quantity, Q_I^*, using an EOQ model (with demand estimated using the average weekly demand).

Suppose GWH implements Alternative I. What is Q_I^*? Create a graph of the inventory level for the next 10 weeks assuming that there are Q_I^* units in inventory at the start of week 1. What is the cost of this policy for the next 10 weeks? How many times will GWH place an

order if this policy is used?

The analysts note that while this policy is a very simple one to implement, it may not be the most cost effective due to the variability in demand. What is the variance and standard deviation of weekly demand, based on the data for the next ten weeks? What percent of demand is the standard deviation (i.e., what is standard deviation/demand)? What do your results tell you about whether or not the EOQ assumption of constant demand is truly satisfied if Alternative I is used to order ovens for GWH?

After doing some research, the analysts suggest using the Wagner-Whitin Algorithm to determine the inventory policy for the next ten weeks (Alternative II). What is the optimal policy for Alternative II? Create a graph of the inventory level for the next 10 weeks assuming that the Wagner-Whitin solution is used. What is the cost of this policy for the next 10 weeks? How many times will GWH place an order if this policy is used?

GWH management has complained that the Wagner-Whitin algorithm is too complicated for an "average person" to use. The analysts then suggests creating an inventory policy using the Silver-Meal heuristic (Alternative III). What is the optimal policy for Alternative III? Create a graph of the inventory level for the next 10 weeks assuming that the Silver-Meal solution is used. What is the cost of this policy for the next 10 weeks? How many times will GWH place an order if this policy is used?

Summarize your results in a table that shows the number of orders placed during the 10 week period, the ordering cost, the holding cost, the purchase cost, and the total inventory cost for each of the four policies (AS-IS, Alternative I, Alternative II, Alternative III, Alternative IV). Which policy do you think GWH should implement and why? (There is more than one good answer but you need only provide one.)