

ISyE 3104 - Homework 5
Due: September 27, 2007
(30 points)

1. Consider the same machine tools company in Atlanta from Homework #4. Recall that the company uses a highly specialized component in one of its tools with model number INC-q33. The sales for this model show a fairly steady demand of 1400 per quarter. Assume that the company currently uses the optimal quantity for ordering from the outside supplier (calculated in part (iii) of homework #4).

Instead of purchasing these components from an outside supplier, the company considers producing them in-house. The company estimates a one-time equipment purchase cost of \$100,000 and this equipment can produce 10,000 units per year. The unit cost of production is estimated at \$4200. It will cost the company \$5,000 to initiate a production run. Inventory holding costs are based on an annual interest rate of 20% and the company works 50 weeks in a year.

- (i) (6 points) If the company produces in-house, find the optimal number of components to produce in a production run as well as the optimal cycle time between the orders.
- (ii) (2 points) What is the maximum inventory level if the company produces in-house? What is the length of a production run, i.e., T_1 ?
- (iii) (7 points) Would you recommend that the company switches to in-house production? Explain. If yes, how long would it take for the company to recover its investment of \$100,000?

2. With the fear of losing its customer, the supplier in question 1 decided to offer a discount schedule as follows:

- \$3750/unit for $Q \leq 200$
- \$3500/unit for $200 < Q \leq 400$
- \$3250/unit for $400 < Q \leq 600$
- \$3000/unit for $Q > 600$

Furthermore, the supplier reduced the fixed cost of ordering to \$8,000.

- (i) (10 points) If the company orders from the supplier, what is the optimal order quantity under this new discount schedule? What is the time between orders?
- (ii) (5 points) Given this new discount schedule, would you recommend that the company switches to in-house production or continue ordering from the supplier? Explain. If yes, how long would it take for the company to recover its investment of \$100,000?