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?