IEOR 3402: Assignment 4

1. Nahmias 4.10.

2. Quarter-inch stainless-steel bolts are consumed in a factory at a fairly steady rate of 60 per week. The bolts cost the plant two cents each. It costs the plant $12 to initiate an order, and holding costs are based on an annual interest rate of 25 percent.
(a) Determine the optimal number of bolts for the plant to purchase and the time between placements of orders.
(b) What is the yearly holding and setup cost for this item?

3. Reconsider the bolt example in Problem 2. Suppose that although we have estimated demand to be 60 per week, it turns out that it is actually 120 per week (i.e., we have a 100 percent forecasting error).
(a) If we use the lot size calculated in the previous problem (i.e., using the erroneous demand estimate), what will the setup plus holding cost be under the true demand rate?
(b) What would the cost be if we had used the optimum lot size?
(c) What percentage increase in cost was caused by the 100 percent demand forecasting error? What does this tell you about the sensitivity of the EOQ model to errors in the data?

4. Consider the bolt example in Problem 2, assuming that the demand of 60 per week is correct. Now, however, suppose the minimum reorder interval is one month and all order cycles are placed on a power-of-two multiple of months (that is, one month, two months, four months, eight months, etc) in order to permit truck sharing with orders of other parts.
(a) What is the least-cost reorder interval under this restriction?
(b) How much does this add to the total cost?
(c) How is the effectiveness of powers-of-2 order intervals related to the result of the previous problem regarding the effect of demand forecasting errors?

5. * Nahmias, 4.17.

6. * In the EOQ model with planned backorders, suppose the parameters are $\lambda = 1000$, $K = 60$, $h = 0.75$ and $b = 0.81$. Compute the optimal policy and the optimal average cost (excluding $c\lambda$).

7. Nahmias, 4.26.

8. * Nahmias, 4.30.