Advanced Operations Management

Fall 2006, Professor Eckstein

Homework 1

Due Thursday, September 14

Show your work for all problems.

1. Problem 1 on page 115 of the text, parts (a), (b), (c), and (e). You do not have to do part (d).

2. Problem 3 on page 115 of the text. Apply the EOQ model and answer both parts (a) and (b).

3. Problem 4 on page 116 of the text, parts (b) and (c). You do not have to answer part (a). In part (c), assume as in part (b) that you are using the EOQ policy. Also, indicate what happens to the turnover TR if the fixed cost of ordering K increases.

4. Consider the following generalization of problem 16 on page 116 of the text: your town has two districts of equal size. In district one, street litter accumulates at R_1 tons per week, while it accumulates in district two at R_2 tons per week. It takes the same time to clean the streets in each district, and you have sufficient labor on hand to perform k cleanings per week. Thus, if you clean district one p times per week, you will be able to clean district two $k - p$ times per week.

   (a) Show that the average amount of street litter in district one will be $R_1/2p$, and the average amount of street litter in district to will be $R_2/2(k-p)$.

   (b) Show that you minimize the total average amount of litter on your town's streets by setting
   $$p = \frac{k\sqrt{R_1}}{\sqrt{R_1} + \sqrt{R_2}}.$$

   (c) Find the average number of times per week you should clean the streets in districts one and two in problem 16 on page 116 of the text, which is the case $R_1 = 2000$, $R_2 = 1000$, and $k = 1$. Note that even though district one accumulates litter twice as fast, you should *not* clean it twice as frequently.

   Note: New York city used more elaborate version of this model to save large amounts of money on litter collection.