

# Operations Research

## Homework 11

Due in class Friday, May 6, 2016

1. (*From HL, Exercise 19.3-4.*) The Blue Cab Company is the primary taxi company in the city of Maintown. It uses gasoline at the rate of 8 500 gallons per month. Because this is such a major cost, the company has made a special arrangement with the Amicable Petroleum Company to purchase a huge quantity of gasoline at a reduced price of \$1.05 per gallon every few months. The cost of arranging for each order, including placing the gasoline into storage, is \$1 000. The cost of holding the gasoline in storage is estimated to be \$0.01 per gallon per month.

Use the EOQ model to find the optimal order quantity.

2. (*HL, Exercise 19.3-14.*) In the basic EOQ model, suppose the stock is replenished uniformly (rather than instantaneously) at the rate of  $b$  items per unit time until the order quantity  $Q$  is fulfilled. Withdrawals from the inventory are made at the rate of  $d$  items per unit time, where  $d < b$ . Replenishments and withdrawals of the inventory are made simultaneously.

- (a) Find the total cost per unit time in terms of the setup cost  $K$ , production quantity  $Q$ , unit cost  $c$ , holding cost  $h$  per unit per time, withdrawal rate  $d$ , and replenishment rate  $b$ .

- (b) Determine the economic order quantity  $Q^*$ .

3. (*HL, Exercise 19.4-1.*) Suppose that production planning is to be done for the next 5 months, where the respective demands are  $r_1 = 2$ ,  $r_2 = 4$ ,  $r_3 = 2$ ,  $r_4 = 2$ , and  $r_5 = 3$ . The setup cost is \$4 000, the unit production cost is \$1 000, and the unit holding cost is \$300. Use the deterministic periodic-review model to determine the optimal production schedule that satisfies the monthly requirements.