Jacobs University
Fall 2021

November 15, 2021

Operations Research

Homework 10

Due on November 22, 2021

Note: Your homework must be submitted via moodle (see the link on the class website) on the due day BEFORE THE TUTORIAL.

Problem 1 [4 points]

(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.

Problem 2 [6 points]

(HL, Exercise 19.3-2.) The demand for a product is 600 units per week, and the items are withdrawn at a constant rate. The setup cost for placing an order to replenish inventory is \$25. The unit cost of each item is \$3, and the inventory holding cost is \$0.05 per item per week.

(a) Assuming shortages are not allowed, determine how often to order and what size the order should be.

(b) If shortages are allowed but cost \$2 per item per week, determine how often to order and what size the order should be.

Problem 3 [10 points]

An airplane manufacturer is contracted to produce a small number of a particular type of airplane during the coming years. The manufacturer will need to decide each year whether to set up a production run with a fixed set-up cost of EUR 1 000 000 per run. During each production run, the manufacturer can make at most 6 airplanes. If an airplane is not delivered during the year it is produced, it will incur a holding cost of EUR 100 000 per year. The number of airplanes required are $r_1 = 1$, $r_2 = 6$, $r_3 = 2$, and $r_4 = 3$ during each of the years.

Which production schedule(s) minimize the total cost for setup and storage?