impuls
Integratives Management produktions-
wirtschaftlicher und logistischer Systeme

UNI GRAZ

Masterkurs Produktion und Logistik
Aufgabenblatt 3

Marc Reimann
Institut für Produktion und Logistik
marc.reimann@uni-graz.at

1. The monthly demand of a product within the next half year is $D = \{20, 10, 15, 10, 15, 20\}$. Ordering costs are 60 Euros per order and holding costs are 2 Euros per unit per month.

   (a) Compute the optimal policy and the associated total costs.

   (b) Assume that inventory can not exceed 15 units per month. Is the policy computed in a) still feasible. If not, compute the new optimal solution and its costs.

   (c) Now assume that holding costs can be reduced to 1 SFR per unit per month through an investment in an inventory management software. Does it make sense to implement this software?

2. For a specific product, the ordering costs are 60 Euros per order and the holding costs are 2 Euros per unit per month. The demand for this product is characterized by the following time series:

   D = 10, 20, 5, ?

   What is the maximal demand in the fourth period such that it is optimal to order the fourth period demand

   (a) in the first period?

   (b) in the second period?

   (c) in the third period?

   (d) in the fourth period?

3. A retailer is faced with the decision problem of ordering a certain quantity from a supplier to meet an uncertain demand in a single selling period. The discrete demand distribution is given in the following table:

Demand	Probability
10	0.2
20	0.2
30	0.2
40	0.2
50	0.2

   The retail price of one unit is 10 Euros, while the purchase cost from the supplier is 5 Euros per unit. Left-over goods do not have any salvage value and goodwill losses in case of shortages are negligible.

(a) What is the optimal order quantity of the retailer, if the objective is to maximize expected profit? How large is the associated expected profit and what is the service level? (Assume that the service level is the probability that the demand can be covered!)

(b) What would be the optimal order quantity, if the objective were to have a service level of at least 90%? How large is the expected profit in this case?

(c) Assume that the supplier knows the retailers decision problem and wants to maximize its own profit. What is the maximum purchase cost the supplier can charge from the retailer, such that the retailer does not change its order quantity? (Assume that the retailer maximizes expected profit.)