

OPERATIONS RESEARCH II 21-393

Homework 4: Due Wednesday October 22.

Q1 In an inventory system:

- A is the fixed cost associated with making an order.
- I is the inventory charge per unit per period.
- π is the back order cost per unit per period.
- λ is the demand per period.
- $\psi > \lambda$ is the rate at which ordered items arrive.

Determine the cost per period as a function of Q, S , the amount ordered and the maximum amount back-ordered per period.

Q2 Analyse the following inventory system and derive a strategy for minimising the total cost. There are n products. Product i has demand λ_i per period and no stock-outs are allowed. The cost of making an order for Q units of a mixture of products is AQ^α where $0 < \alpha < 1$. The inventory cost is I times $\max\{L_1, L_2, \dots, L_n\}$ per period where L_i is the average inventory level of product i in that period.

Q3 The Vertex Cover problem is defined as follows: given a graph $G = (V, E)$ find the smallest subset $S \subseteq V$ such that every edge in E has at least one endpoint in S . Show that starting with $S = \emptyset$, if you repeatedly add the vertices of an uncovered edge to S then the final set constructed has at most twice the optimum number of vertices.