Department of Mathematical Sciences
CARNEGIE MELLON UNIVERSITY

OPERATIONS RESEARCH II 21-393

Homework 4: Due Friday October 11.

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 ber 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 $\max\{L_1, L_2, \ldots, L_n\}$ per period where L_i is the average inventory level of product i in that period.

Q3 Give an algorithm to solve the following scheduling problem. There are n jobs labelled $1, 2, \ldots, n$ that have to be processed one at a time on a single machine. There is an acyclic digraph $D = (V, A)$ such that if $(i, j) \in A$ then job j cannot be started until job i has been completed. The problem is to minimise $\max_j f_j(C_j)$ where for all j, f_j is a monotone increasing. As usual, C_j is the completion time of job j. This is distinct from its processing time p_j.