Department of Mathematical Sciences CARNEGIE MELLON UNIVERSITY

OPERATIONS RESEARCH II 21-393

Homework 3: Due Friday November 5.

- 1. Find the optimal ordering strategy for the following inventory system. If you order an amount Q, it costs AQ^{α} for some $0 < \alpha < 1$ and the inventory cost is I per unit per period. The demand is λ units per period and no stock-outs are allowed.
- 2. Find an optimal inventory policy for the model with the following parameters: It is a generalisation of Models 2 and 3 of notes.
 - A Cost of making an order.
 - λ Demand per period for items.
 - ψ Arrival rate of ordered items.
 - *I* Inventory cost per item per period.
 - π Penalty cost per item out of stock per period.
 - (a) First draw a diagram showing the inventory level over time and various parameters.
 - (b) Then identify the various costs per period.
 - (c) Optimize total cost.
- 3. Given that assigning person *i* to job *i* for i = 1, 2, 3 is optimal for the 3×3 problem associated with the first 3 rows and columns of the matrix below, find an optimal solution to the 4×4 problem:

$$\begin{bmatrix} 1 & 4 & 2 & 4 \\ 3 & 2 & 6 & 2 \\ 3 & 5 & 1 & 3 \\ 0 & 5 & 6 & 7 \end{bmatrix}$$