Department of Mathematical Sciences
Carnegie Mellon University

21-393 Operations Research II
Test 2

Name:_____

Problem	Points	Score
1	40	
2	40	
3	20	
Total	100	

Q1: (40pts)
Ananlyse the following inventory system. There are two products. Product i has demand λ_i per period and no stock-outs are allowed. The cost of making an order of Q_i units of product i is $A(Q_1 + Q_2)^\alpha$. The inventory cost is $I \max\{L_1, L_2\}$ per period where L_i is the inventory level of product i in that period.

Q2: (40pts) 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:

$$\begin{bmatrix} 1 & 4 & 3 & 5 \\ 4 & 3 & 7 & 3 \\ 4 & 6 & 2 & 4 \\ 1 & 6 & 7 & 8 \end{bmatrix}$$

Q3: (20pts)
Formulate the following as an integer program: There are n students and exams $E_1, E_2, \ldots, E_m \subseteq [n]$ need to be scheduled. There is only one room available and it can hold r students. The rules are (i) A student must not be asked to take more than one exam per day; (ii) Several different exams can be held provided there is capacity in the room to hold the students. The problem is to minimise the number of days needed to carry out all of the exams.