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)

Find the optimal ordering strategy for the following inventory system. If you order an amount Q, it arrives at a rate ψ, it costs AQ^α for some $0 < \alpha < 1$. The inventory cost is I times M^β per period, for some $\beta > 0$, where M is the maximum inventory. The demand is $\lambda < \psi$ units per period and no stock-outs are allowed.

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:

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

Q3: (20pts)

Formulate the following as an integer program: A new building has n rooms. The organisation that will occupy it has n departments and each department will be assigned a unique room. The distance between room i and room j is $d_{i,j}$. The annual amount of traffic between department p and department q is $t_{p,q}$. Departments are to be assigned to rooms in order to minimise the total distance travelled in a year.