Department of Mathematical Sciences
Carnegie Mellon University

21-393 Operations Research II
Test 1

Name:_____

Problem	Points	Score
1	20	
2	40	
3	40	
Total	100	

Q1: (20pts)
Solve the following game:

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

Q2: (40pts)
In an inventory system for a single product there is a cost of $AQ^{1/2}$ for making an order of size Q.The demand for the product is λ per period. No stockouts are allowed. The inventory cost per period is $Ih^{1/2}$ where h is the average amount of stock held. Determine an optimal purchasing/stock strategy.

Q3: (40pts)
There are two machines available for the processing of n jobs. The processing time of job j is $p_j > 0$ for $j = 1, 2, \ldots, n$. The objective is to assign jobs to machines in order to minimise $C_{\max} = \max\{C_j : j = 1, 2, \ldots, n\}$ where C_j is the completion time of job j. Let

$$P_1 = \sum_{j=1}^{n} p_j \text{ and } P_2 = \max\{p_j : j = 1, 2, \ldots, n\}$$

Show that the optimal solution satisfies

$$\frac{P_1}{2} \leq C_{\max} \leq \frac{P_1 + P_2}{2}.$$