Department of Mathematical Sciences
Carnegie Mellon University

21-393 Operations Research II
Test 2

Name:_____

Problem	Points	Score
1	33	
2	33	
3	34	
Total	100	

Q1: (33pts)
Find the value of the following 2-person zero-sum games, Justify your answers.

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

Q2: (33pts)
Find a symmetric equilibrium for the first price sealed bid auction in the case where there are N bidders and $F(x) = 1 - 2x$ for $0 \leq x \leq 1/2$.

Q3: (34pts) Find an optimal inventory policy for the model with the following parameters: It is a generalisation of Models 2 and 3 of the 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.

1. First draw a diagram showing the inventory level over time and various parameters.

2. Then identify the various costs per period.

3. Optimize total cost.