Department of Mathematics
Carnegie Mellon University

21-393 Operatons Research II
Test 1

Name:_____

Problem	Points	Score
1	33	
2	33	
3	34	
Total	100	

Q1: (33pts)
Construct a payoff matrix for the following 2 person, zero-sum game. Then set up a linear program whose solution provides a solution to the game.

The labor union and management of a particular company have been negotiating a new labor contract. However, negotiations have now come to an impasse, with management making a *final* offer of a wage increase of \$1.10/hour and the union making a *final* demand of \$1.60/hour increase. Therefore, both sides have agreed to have an arbitrator set the wage increase somewhere between \$1.10/hour and \$1.60/hour (inclusively).
The arbitrator has asked each side to submit to her a confidential proposal for a fair and economically reasonable wage increase (rounded to the nearest dime). From past experience, both sides know that this arbitrator normally accepts the proposal of the side that gives the most from its final figure, or if both give the same amount, then the arbitrator normally compromises halfway between (\$1.35 in this case).

Q2: (33pts)
Solve the following problem by using the Kuhn-Tucker conditons:

$$\begin{array}{lll} \text{Minimise} & (x_1-3)^2+(x_2-2)^2 & \\ \text{Subject to} & x_1+x_2 & \leq \ 2 \\ & 2x_1+x_2 & \leq \ 3 \end{array}$$

Q3: (34pts)
Solve the following problem by the modified simplex algorithm.

$$\begin{array}{lll} \text{Minimise} & (x_1 - 3)^2 + (x_2 - 2)^2 & \\ \text{Subject to} & x_1 + x_2 & \leq \quad 2 \end{array}$$