Department of Mathematical Sciences
Carnegie Mellon University
21-393 Operations Research II
Test 2

Name:_____

Problem	Points	Score
1	35	
2	35	
3	30	
Total	100	

Q1: (35pts)

1. Construct an inequality in $0/1$ variables x, y, z which is satisfied for all values of x, y, z except for the case that $z = 0$ and $x = y = 1$.

2. Using 1., construct a set of inequalities in $0/1$ variables $x_1, x_2, \ldots, x_n$ such that $\{i : x_i = 1\}$ is an interval of length m.

3. Construct a set of inequalities in $0/1$ variables $x_1, x_2, \ldots, x_n$ plus some additional $0/1$ variables such that $\{i : x_i = 1\}$ forms two disjoint intervals of length m.

Q2: (35pts)

Find an expression for the total cost per period for the following inventory system. If you order an amount Q, it arrives immediately and the cost of the order is 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 average inventory. The demand is λ units per period and there is a penalty cost of P time N^γ per period, where N is the average amount out of stock.

Q3: (30pts)

Players A and B play the following game. A chooses a number $x_A \in \{0, 1, 2, 3\}$ and B chooses a number $x_B \in \{0, 1, 2\}$. If $x_A + x_B$ is odd, A wins a point, otherwise B wins a point.

Write down a linear program whose solution will produce an optimum strategy for A. **YOU DO NOT HAVE TO SOLVE THE PROGRAM**.