

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)

Two players simultaneously choose an integer between 1 and n inclusive. If the numbers are equal there is no payoff. If a player chooses a number one larger than the one chosen by his opponent then he wins one. If a player chooses a number two or more larger than his opponent then he loses two. Using dominance, reduce the game to a 3×3 game.

Q2: (33pts)

Solve the following integer programming problem by using a cutting plane algorithm:

$$\begin{aligned} & \text{Maximise } x_1 + 2x_2 \\ & \text{Subject to } 3x_1 + 4x_2 \leq 5 \\ & \quad x_1, x_2 \geq 0 \text{ and integer.} \end{aligned}$$

Q3: (34pts)

Formulate the following problem as an integer program: A set of n items are to be repaired in a factory. Item i takes time t_i to repair and requires w_i workers working continuously. It arrives at time a_i and it must be finished by time d_i . The problem is to find a repair schedule that minimises the total number of workers. (When a worker has finished working on one job, he/she can work on another job).