Department of Mathematics
Carnegie Mellon University

21-228 Discrete Mathematics, Fall 1999: Test 3

Name:____________________________________

Please circle your TA's name: Ojas Parekh   Goran Konjevod

Problem	Points	Score
1	34	
2	33	
3	33	
Total	100	

No notes, tables, books, calculators can be used during the test!

Q1: (34pts) Solve the following linear recurrence using generating functions:

$$u_n - 6u_{n-1} + 9u_{n-2} = (n-1)3^n, \qquad\qquad n \geq 2.$$

$u_0 = u_1 = 0.$

Q2: (33pts) n children take off their shoes. In how many ways can the children be given back their shoes, so that no child gets **both** of his/her own shoes returned. Each child has their own left shoe and right shoe and is given back a left shoe and a right shoe. Right and left shoes are distinguishable and the shoes of different children are also distinguishable.

Q3: (33pts) Let b_n denote the number of 0/1 strings of length n which do not contain 111 as a substring. Find a recurrence for b_n.