CSE 2001: Introduction to Theory of Computation

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Suprakash Datta

datta@cse.yorku.ca

Office: CSEB 3043

Phone: 416-736-2100 ext 77875

Course page: http://www.cs.yorku.ca/course/2001

Midterm Distribution

0-2	3
2.01 - 5	9
5.01- 8	11
8.01- 10	15
10.01-12	8
12.01 - 14	13
14.01-16	4
>16	8

Mathematical Induction

- Powerful proof technique
- When does it work?
- Why is it useful?

- Easy problem: Prove that 21 divides $4^{n+1} - 5^{2n-1}$ whenever n is a positive integer.

No. of subsets of a finite set

- Prove that a set S with n elements has 2^n subsets

Generalizing De Morgan

- $(A \cap B)^c = A^c \cup B^c$ (Rosen pg 323)

Problems

- (Q 19, pg 330, Rosen) Let P(n) be the statement that
  $1 + 1/4 + 1/9 + \ldots + 1/n^2 < 2 - 1/n$
- (Q 61, pg 332, Rosen) Show that n lines separate the plane into $(n^2 + n+2)/2$ regions if no two of these lines are parallel and no three of these lines intersect at a point.

Another Problem

Odd Pie Fight (Rosen pg 324)

- An odd number of people stand at mutually distinct distances. Each person throws a pie at their nearest neighbour. There is at least one person not hit by a pie.

- Is this true if the number of people is even?

String Induction

- Every number greater than 1 is the product of primes.

Harder Problem

- Arden's Lemma: Assume that A, B are 2 languages with epsilon not in A, and X is a language satisfying $X = AX \cup B$. Then $X = A^*B$.
- Prove each direction by induction.