Introduction into Mathematical Systems  
Math3390  
Fall 2009  
Assignment No.5  
Deadline: Wednesday March 24

Group A

Problem 1 5pts
Let $S$ be a square with sides of length 1. Let $A$, $B$ and $C$ be three subsets of $S$ with the areas larger than $\frac{1}{2}$. What is the minimum possible value of the maximal area of three intersections $A \cap B, ~ A \cap C, ~ B \cap C$?

Problem 2 5pts
Nine students entered a bar. An usher collected their ID cards. When the usher returned the cards, students noticed that they all got somebody else’s ID card and not their own. What were the chances(probability) of this happening?

Group B

Problem 1 5pts
Derive the Inclusion-Exclusion Formula for five sets.

Problem 2 5pts
Six students entered a bar. An usher collected their ID cards. When the usher returned the cards, students noticed that they all got somebody else’s ID card and not their own. What were the chances(probability) of this happening?

Group C

Problem 1 5pts
Derive the Inclusion-Exclusion Formula for four sets.
Problem 2 5pts

How many integers between 1 and 1,000,000 are divisible by 2 or 3 or 5 or 7?