EECS 70 Discrete Mathematics and Probability Theory
Fall 2014 Anant Sahai

Discussion 1W

1. DeMorgan's Law

Use truth tables to show that $\neg(A \vee B) \equiv \neg A \wedge \neg B$ and $\neg(A \wedge B) \equiv \neg A \vee \neg B$. These two equivalences are known as DeMorgan's Law.

2. Notation Practice

Write the following statements using the notation covered in class. (Use $\mathbb{N}$ to denote the set of natural numbers and $\mathbb{Z}$ to denote the set of integers. Also write $P(n)$ for the statement "n is odd".)

1. For all natural numbers n, $2n$ is even.

2. For all natural numbers n, n is odd if n^2 is odd.

3. There are no integer solutions to the equation $x^2 - y^2 = 10$.

3. Infinite Primes

Prove by contradiction that there are an infinite number of primes.

4. Prime Form

Prove that every prime number $m > 3$ is either of the form $6k+1$ or $6k-1$ for some integer k.

5. Numbers of Friends

If there are $n > 2$ people at a party, then at least 2 of them have the same number of friends at the party. Prove this by contradiction.

6. The Triangle Inequality

You may remember from a previous math class the *triangle inequality*, which states that for real numbers x_1 and x_2,

$$|x_1 + x_2| \leq |x_1| + |x_2|.$$

Generalize the triangle inequality using mathematical induction to prove that

$$|x_1 + x_2 + \ldots + x_n| \leq |x_1| + |x_2| + \ldots + |x_n|.$$