Problem Set 1 – Due Monday, September 29

Recall that homeworks are due at 4:30 pm and are turned in at 2131 Kemper

1. Show that $n^2 + n$ is even for any integer n.

2. Prove that if n is an odd integer then there is an integer m such that $n = 4m + 1$ or $n = 4m + 3$.

3. Suppose you draw $n \geq 0$ distinct lines in the plane, one after another, none of the lines parallel to any other and no three lines intersecting at a common point. The plane will, as a result, be divided into how many different regions L_n? Find an expression for L_n in terms of L_{n-1}, solve it explicitly, and indicate what is L_{10}.

4. How many n-disk legal configurations are there in the Tower of Hanoi problem? A "legal configuration" entails that no disk is larger than a disk beneath it on the same peg. All n disks have different diameters.

5. Prove that there exist irrational numbers a and b such that a^b is rational. *(Hint: try $a = b = \sqrt{2}$)*