HW 3: due Wednesday February 5.

1. Prove that for all $n > 1$ the harmonic number H_n is not an integer.

(I personally like to think about the largest power of 2 which is $\leq n$.)

2. Give a careful proof of the equation

$$\sum_{k=1}^{n} \frac{(-1)^{k-1}}{k} \binom{n}{k} = \sum_{k=1}^{n} \frac{1}{k}.$$

3. Prove that the *Catalan* numbers C_n are all integers:

$$C_n = \frac{1}{n+1} \binom{2n}{n}, \quad n = 0, 1, 2, \cdots.$$

Next Wednesday the handout will be **EXAM 1**. It will be due one week later, and will be very much like the HW assignments, except that you will have to work alone.