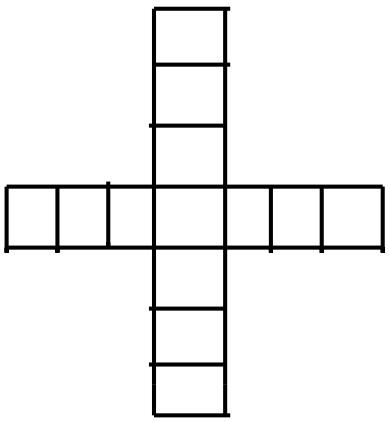
21-301 Combinatorics
Homework 7
Due: Monday, November 24

1. How many ways are there to arrange 3 M's, 6 A's, 8 T's and 4 H's under the condition that any arrangement and its reversal are to be considered the same.

2. How many ways are there of k-coloring the squares of the cross below if the group acting is e_0, e_1, e_2, e_3 where e_j is rotation by $2\pi j/4$. Assume that instead of 13 squares there are $4n + 1$.



3. Let $\mathcal{H} = \{H_1, H_2, \ldots, H_m\} \subseteq \binom{E}{k}$. Suppose also that $|H_i \cap H_j| \leq k - 2$ for $i \neq j$. Show that $\mathcal{B}_{\mathcal{H}} = \binom{E}{k} \setminus \mathcal{H}$ forms the set of bases of a matroid.
($\binom{E}{k} = \{S \subseteq E : |S| = k\}$.)