21-301 Combinatorics
Homework 7
Due: Wednesday, November 3

1. How many ways are there to arrange 2 M's, 4 A's, 5 T's and 6 H's under the condition that any arrangement and its reversal are to be considered the same.

2. Find the set of P-positions for the take-away games with subtraction sets

   (a) $S = \{1, 3, 7\}$.
   (b) $S = \{1, 4, 6\}$.

   Suppose now that there are two piles and the rules for each pile are as above. Now find the P positions for the two pile game where in one pile S is as in (a) and the other pile is as in (b).

3. In a take-away game, the set S of the possible numbers of chips to remove is finite. Show that the Sprague-Grundy numbers satisfy $g(n) \leq |S|$ where n is the number of chips remaining.