## 21-301 Combinatorics Homework 4 Due: Monday, October 10

1. How many ways are there of coloring the squares of diagram below in q colors if the group acting is  $G = \{e, a, b, c, p, q, r, s\}$  of the notes on "Polya Theory of Counting".



You can assume that each arm has n squares.

2. How many ways are there of coloring the edges of the diagram below in q colors if the group acting consists of sequences of rotations of the sub-tree under a vertex. Think of each permutation as a permutation of the letters x, y, z, w. First determine the group elements. There are 8 in all.



3. How many ways are there of placing k 1's on a regular convex n-gon if each 1 must be separated by at least 2 0's. You can assume that the group acting consists of the rotations through  $\frac{2\pi j}{n}$  for  $j = 0, 1, \ldots, n-1$ . To simplify matters, you can assume that k is prime.

It will help to understand the material on pp20/21 of the notes: "Polya theory of counting".