

1 Math 434: Problem Set 2

1.1 More Rubik's Cube Problems.

1. Solve the top layer of the Rubiks Cube by
 - (a) Developing an algorithm for restoring the UP layer of edge cubelets to proper orientation.
 - (b) Developing an algorithm for restoring the UP layer of corner cubelets to proper orientation.
2. Use the processes we have noted to write down an algorithm for solving the Rubiks Cube. Specifically, list your algorithm steps and explain which of our processes to use in order to attain the goals of that step. For example, one of our processes is

$$(flu, rub, rfu)(fu.ru, dr) = [F, R]U[R, F]U^{-1}.$$

So one substep of your algorithm might be

- (a) Get all top corner cubelets on the top layer
 - i. Correctly position the top corner cubelets
 - A. **(This is the substep in my illustration)** If one cubelet is in position but the other three are all out of position, then either one or two applications of $(flu, rub, rfu)(fu.ru, dr) = [F, R]U[R, F]U^{-1}$ will position the remaining three.

You might want to note that the edge cubelets are moved by this process but they will be repositioned correctly in a later step of the algorithm and that the corner cubelets still need to be oriented correctly.

3. (Worth **four** problems) Develop all of the processes necessary to solve the TopSpin game and write up an algorithm for solving it. Include a justification for how many of the states are reachable and, if possible, which permutations in S_{20} they represent.