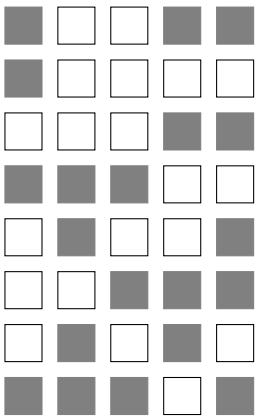
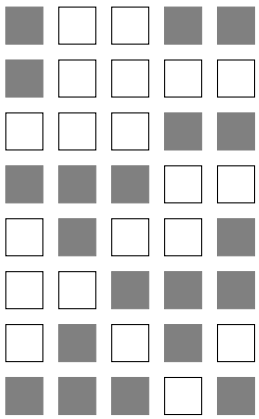
Math 1015: Homework #6

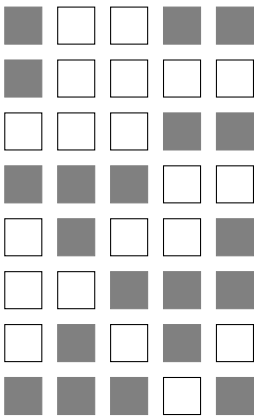
The last page includes some extra copies of the pictures so you can practice. This whole document is at the class website in case you need to print it again.

Question 1. In this grid there are 20 white squares and 20 dark squares. We must divide the grid into 4 districts of 10 voters each.

a) Please draw 3 sets of districts which would result in different election outcomes. You can acheive 3 white / 1 black, 2 white / 2 black, and 1 white / 3 black. Clearly label which picture gives which result.



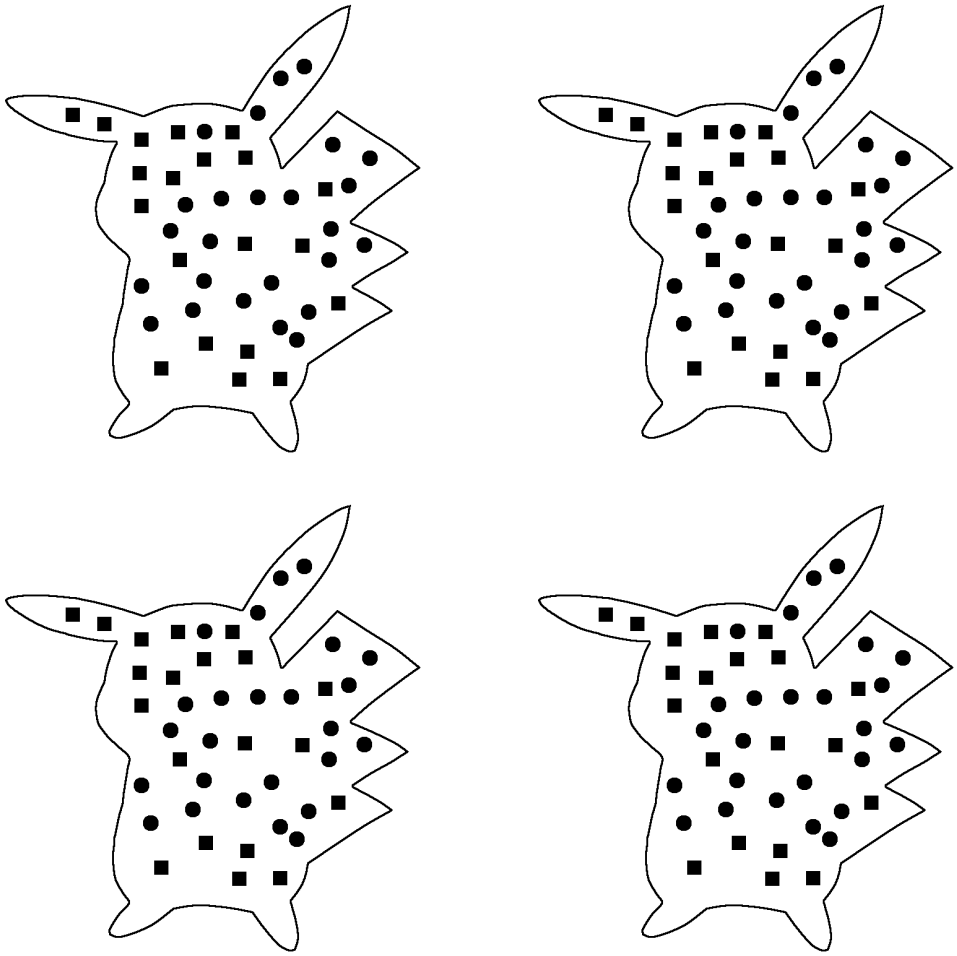




b) Please explain why it is impossible to draw districts giving 4 white / 0 black or 0 white / 4 black.

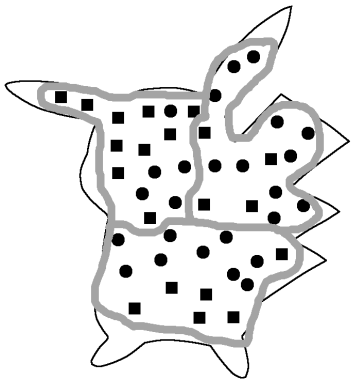
Question 2. Pikachuland has 45 inhabitants: 20 squares and 25 circles. We need to divide them into 3 districts of 15 voters each.

a) Please determine all possible outcomes that can be achieved by districting, and draw diagrams for all the possible ones. (You may not need to use all of these pictures.) Clearly label which picture gives which result.



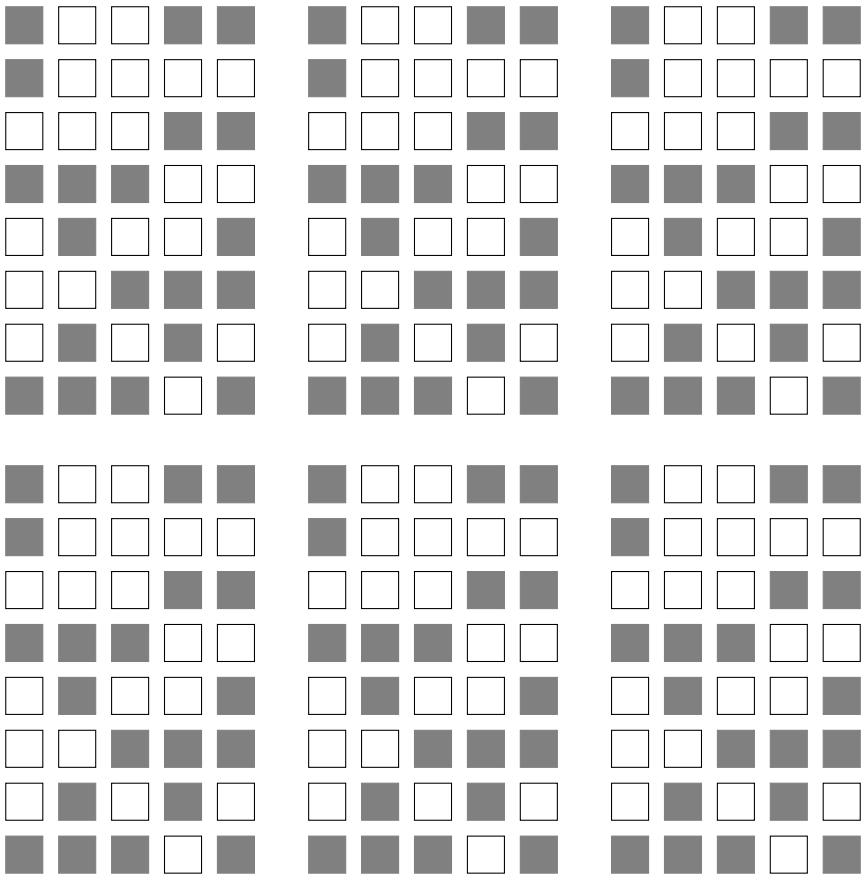
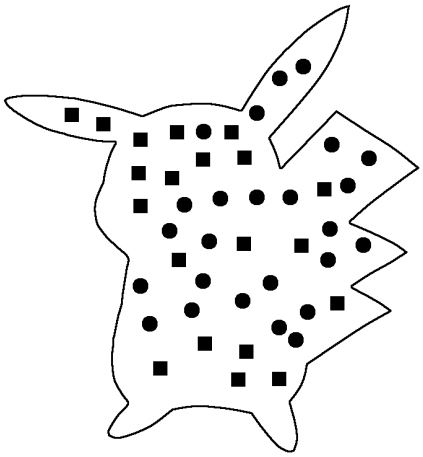
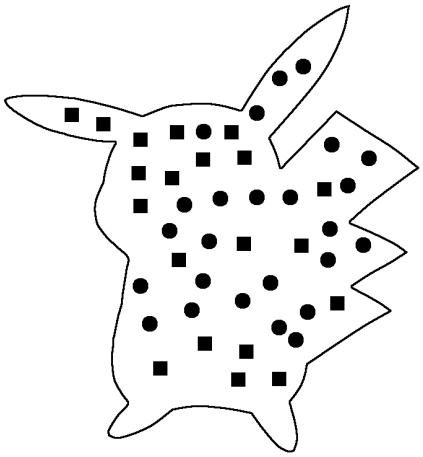
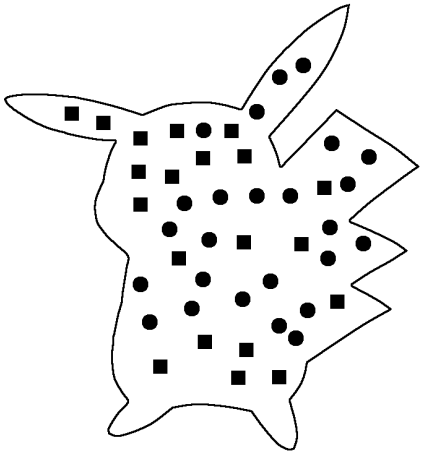
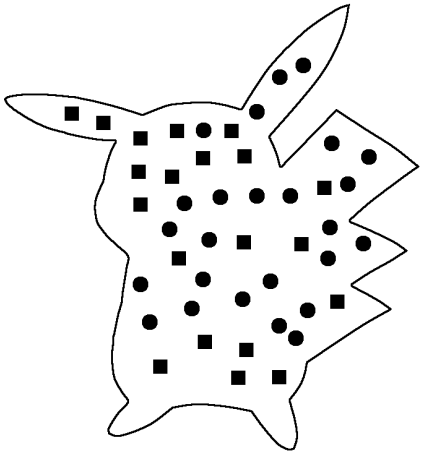
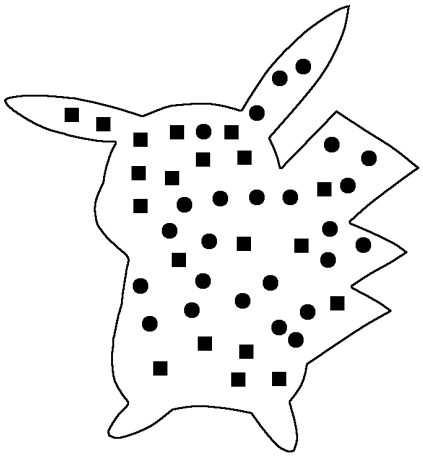
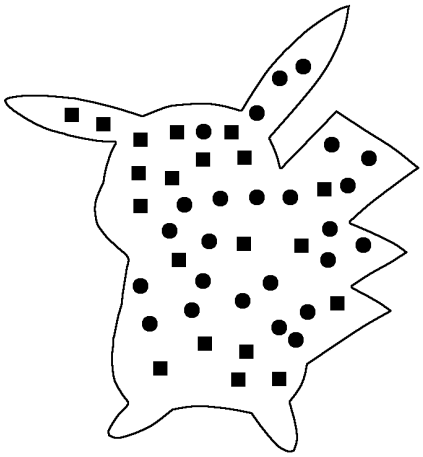
b) For all outcomes that you did not draw, explain why they are impossible.

Question 3. Here is one possible districting plan for Pikachuland:



Please compute the efficiency gap for this map. State your final answer as a percentage (use a calculator), and state who is being favored.

Your answer should look like: "The EG is ???% in favor of ???"

Question 4. The state of Iowa has 4 districts for the US House of Representatives. Look up the data for the Iowa elections in 2020, and compute the efficiency gap. Your answer should look like: "The EG is ???% in favor of ???"

I found the voting numbers on Wikipedia "2020 United States House of Representatives elections in Iowa". You can simplify things by rounding all numbers to thousands, and ignoring all votes for third-party candidates. Make sure you are using 2020 numbers.