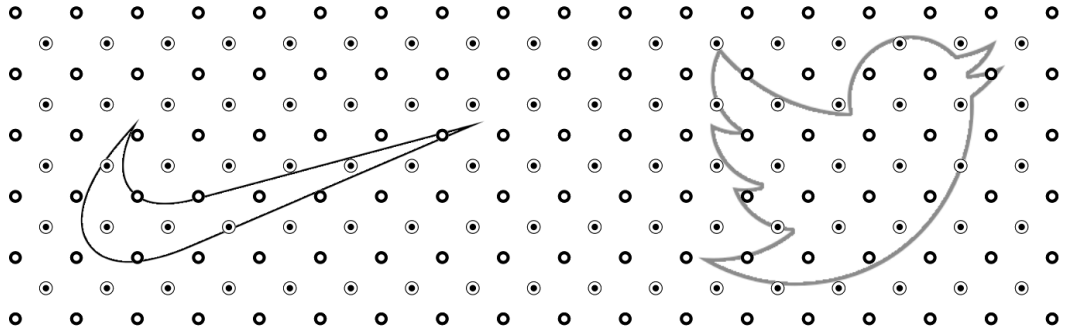


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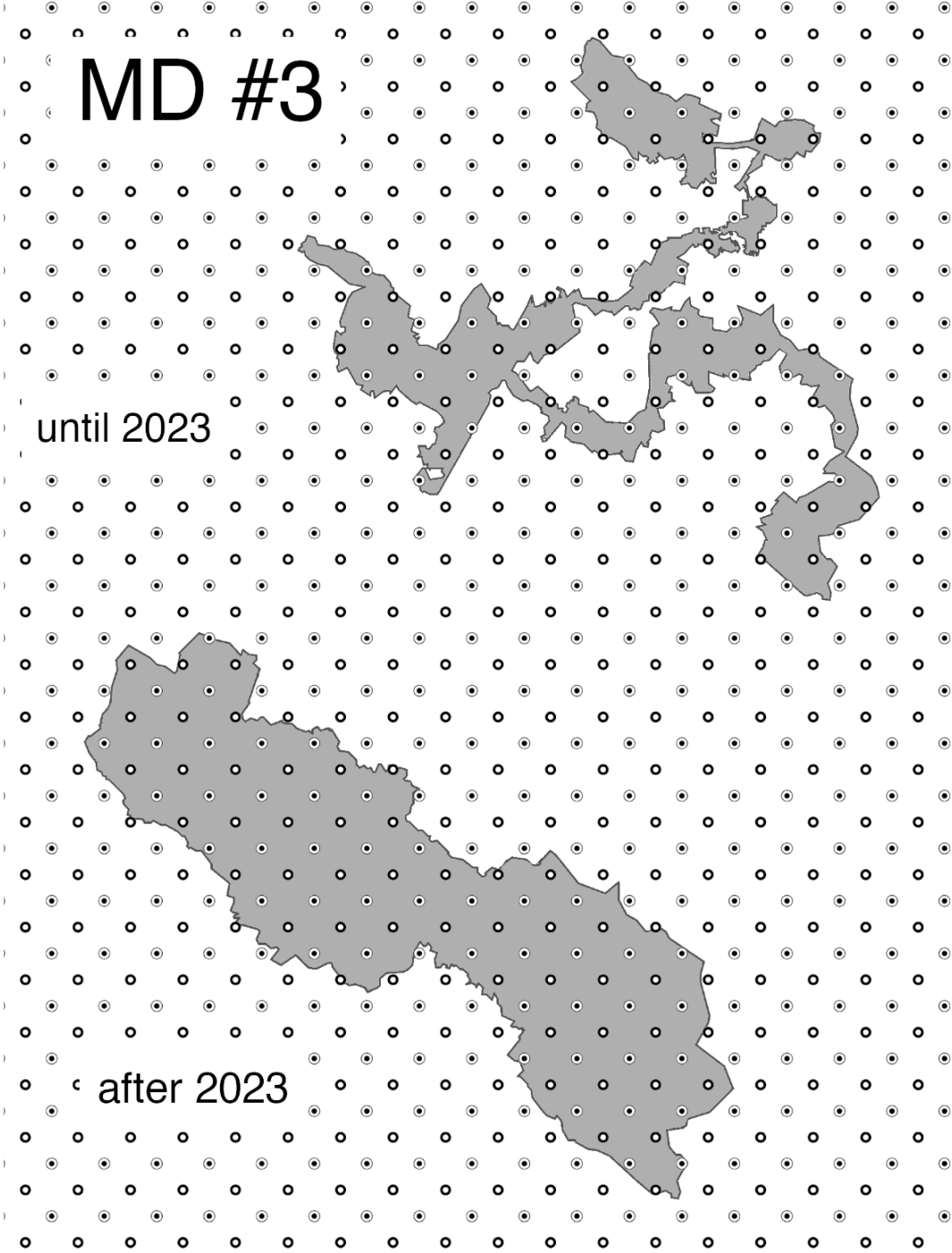
Math 1015: Homework #8

Question 1. a) For each of these pictures, find the convex hull ratio.

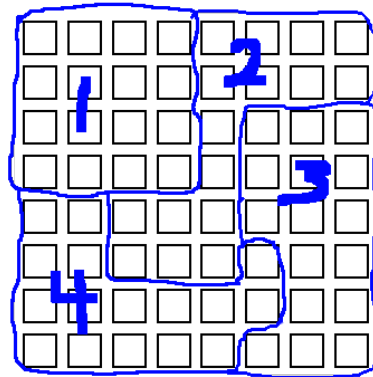
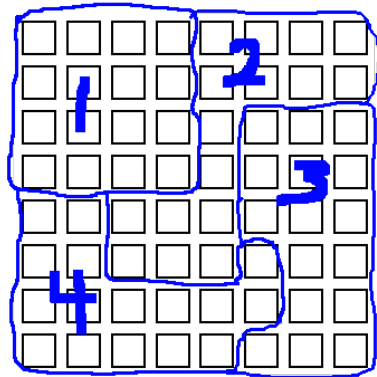
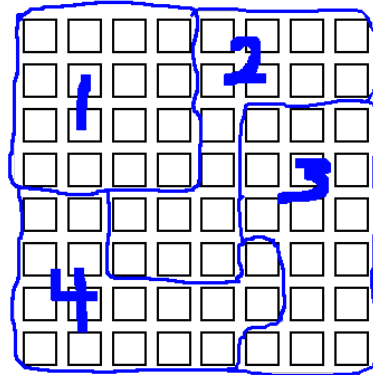
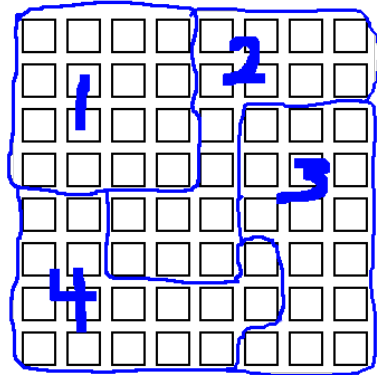


b) According to the Convex Hull ratio, which is the weirder shape?

Question 2. The state of Maryland has absurdly shaped districts, but they are changing starting in 2023. Find the convex hull ratio of the old and new versions of MD district #3.



Question 3. a) Find the isoperimetric quotient of each of these 4 districts. (I gave you the picture 4 times so you can draw on one for each district.)



b) According to the isoperimetric quotient, which shape is the weirdest (use a calculator so you can compare the values)? Which is the least weird?

For the rest of these questions, write your answers on your own separate paper

Question 4. a) Draw an example of a graph having 8 vertices and 13 edges.

b) Next to each vertex, write its degree.

c) Say if your graph is connected or not.

Question 5. My daughter plays little league softball in the town of Fairfield (true story). There are 8 teams in her age-group, with 12 girls on each team (made-up numbers), each girl is on only 1 team. Imagine a graph where each vertex is a girl on some team, and two vertices are connected by an edge if those two girls are on the same team.

a) What is the degree of my daughter's vertex in this graph?

b) Is the graph connected? Say why or why not.

Question 6. Imagine a graph where each vertex is a word in the "Happy birthday to you" song, ignoring the person's name. (There should be 5 vertices.) Two vertices are connected by an edge when the two words have some letter in common.

a) Draw this graph.

b) Redraw the graph, but with your own name added into the song.

c) Instead of your name, think of a name that we could add that makes the graph become disconnected. (You don't have to use a real name— you can just make up some jumble of letters that would work.)