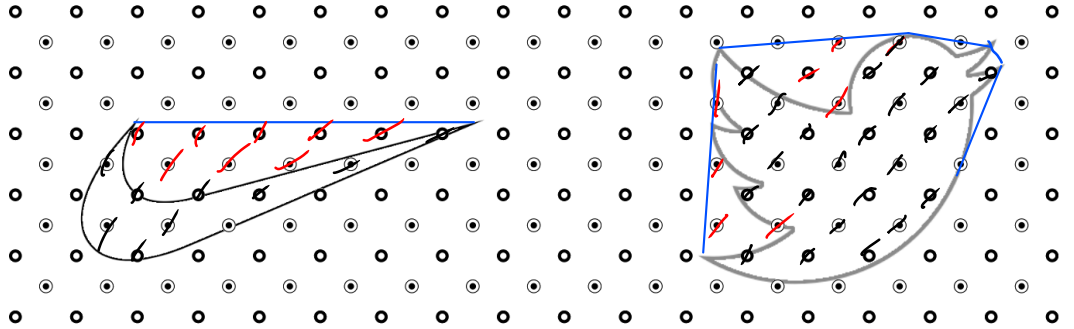


Name: _____

Math 1015: Homework #8

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



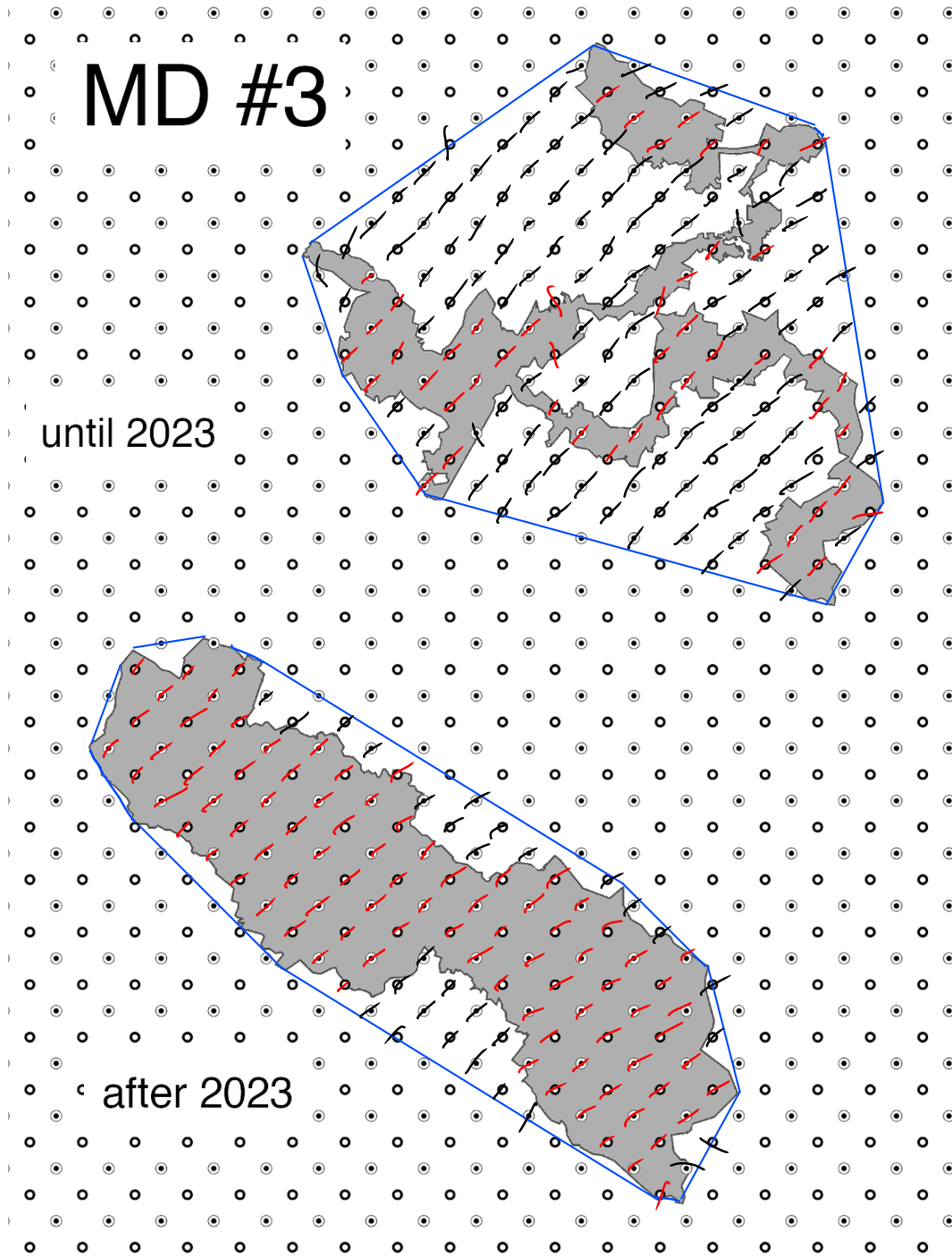
$$\text{Nike: } \frac{9}{17} = 53\%$$

$$\text{Twitter: } \frac{24}{31} = 77\%$$

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

Nike is less, so it is weirder.

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.



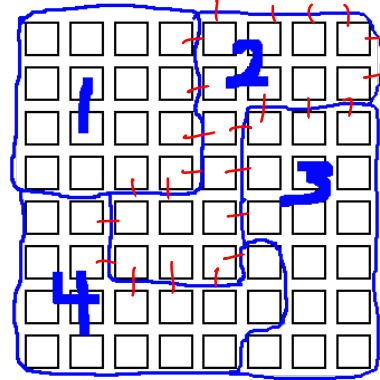
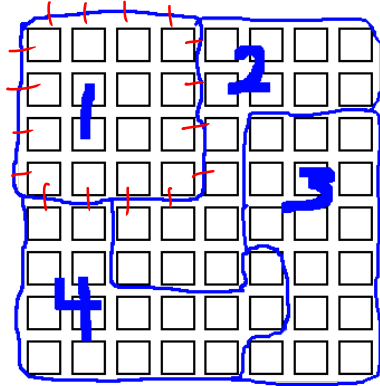
New one: $\frac{89}{118} = 75\%$

Old one: $\frac{48}{160} = 30\%$

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.)

#1: $A = 16$
 $P = 16$

$$IQ = \frac{4\pi \cdot 16}{16^2} = 78\%$$

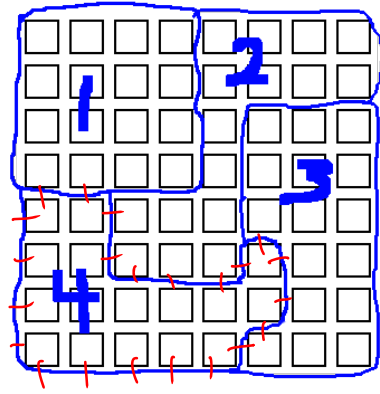
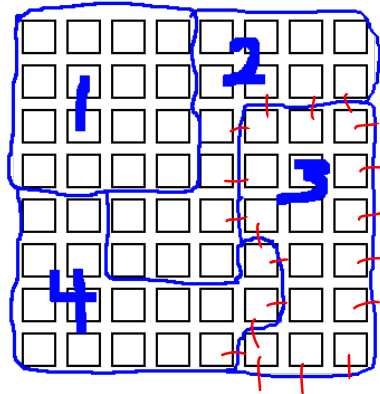


$A = 16$
 $P = 24$

$$IQ = \frac{4\pi \cdot 16}{24^2} = 34\%$$

$A = 16$
 $P = 19$

$$IQ = \frac{4\pi \cdot 16}{19^2} = 56\%$$



$A = 16$
 $P = 22$

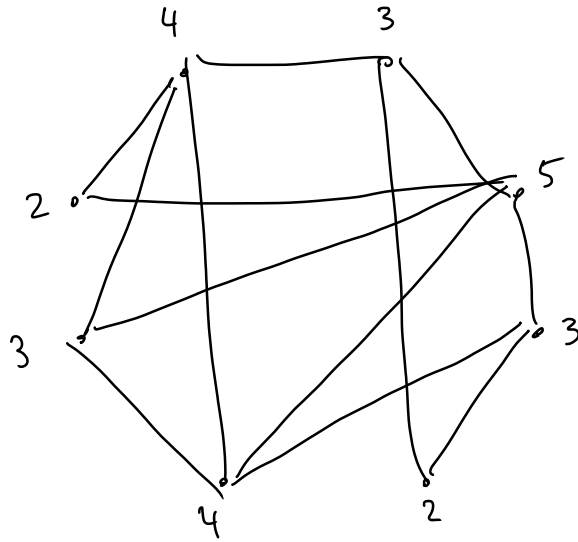
$$IQ = \frac{4\pi \cdot 16}{22^2} = 41\%$$

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?

#2 is the worst,

#1 is the best.

- 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.



It is connected.

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.

a) there's 11 others on her team, so
her degree is 11.

b) NO - no girl has a path to someone
on a different team.