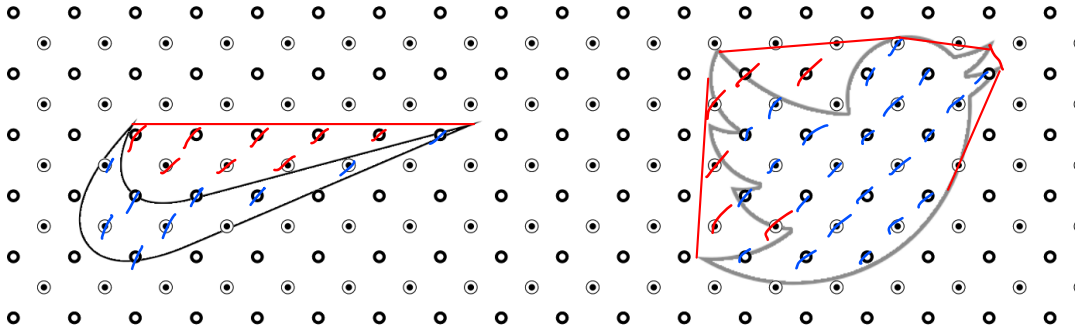
Name: _____

Math 1015: Homework #7

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



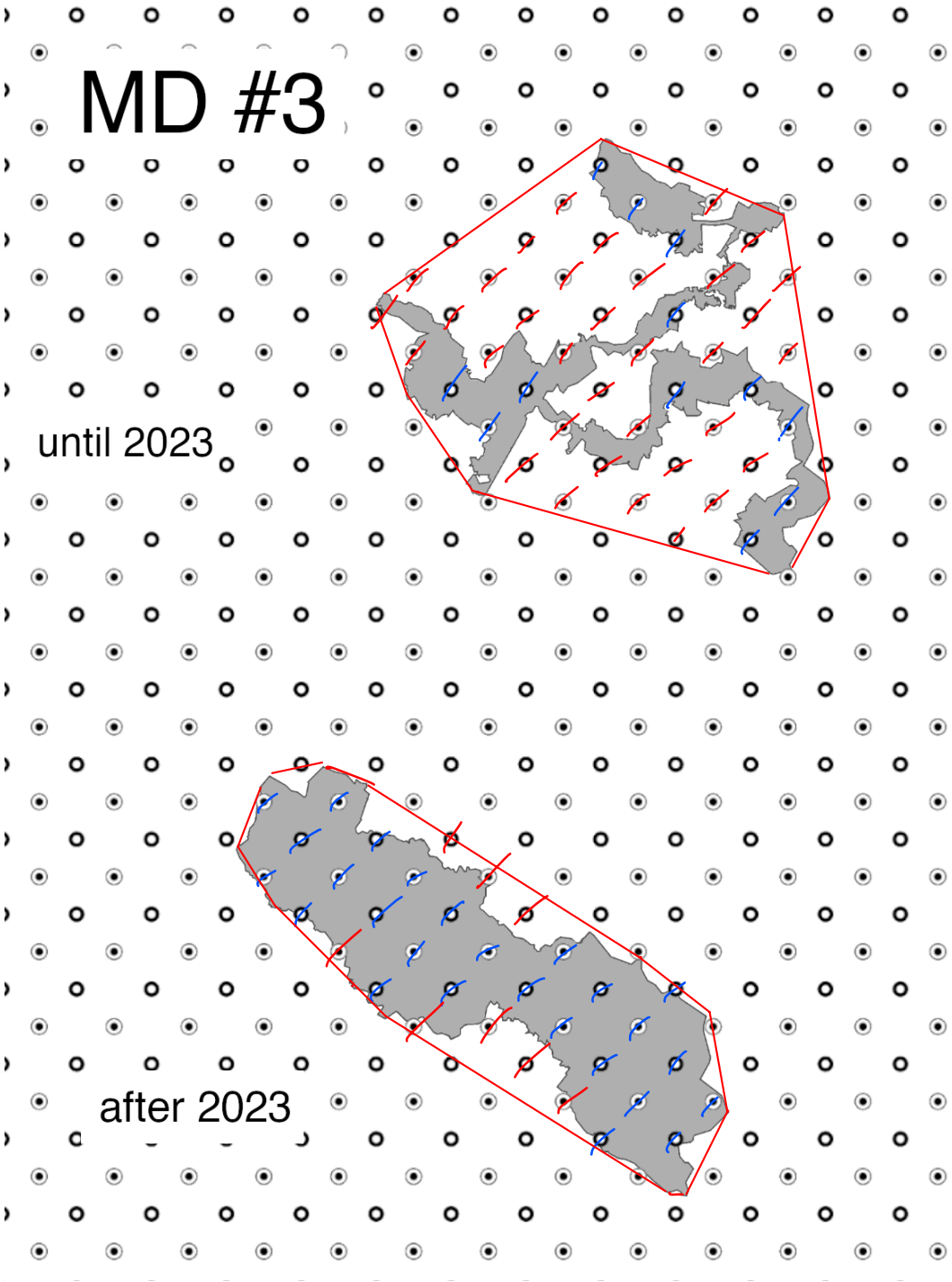
$\frac{9}{17} = .52$

$\frac{23}{29} = .79$

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

.52 is less, so the Nike 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.



$\frac{12}{46} = .26$

$\frac{26}{34} = .76$

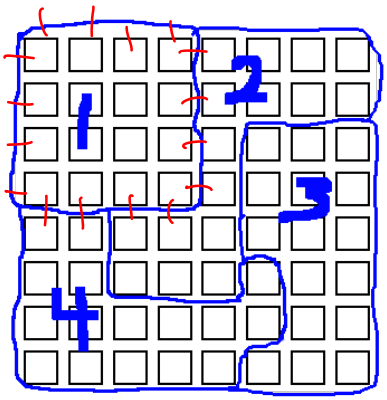
Question 3. a) Find the isoperimetric quotient of each of these 4 districts. (I gave you the picture 4 times so you can draw on one for each district.)

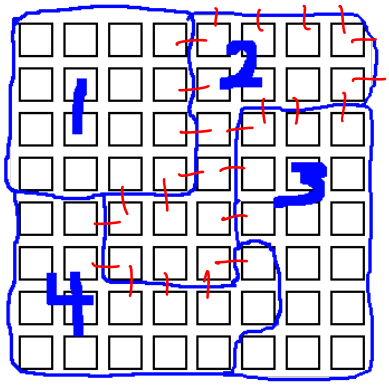
#1: $A = 16$

$P = 16$

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

$= .785$





#2 $A = 16$

$P = 24$

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

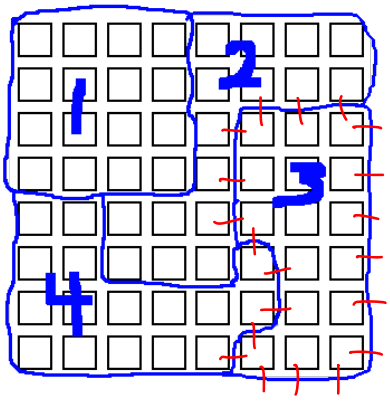
$= .349$

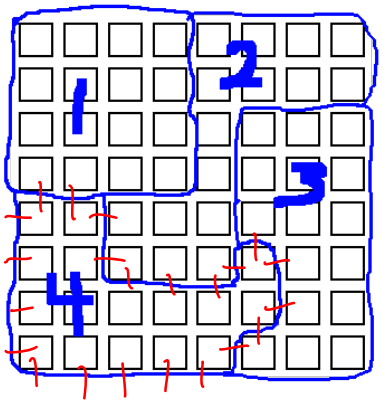
#3: $A = 16$

$P = 20$

$IQ = \frac{4\pi \cdot 16}{20^2}$

$= .502$





#4: $A = 16$

$P = 22$

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

$\approx .415$

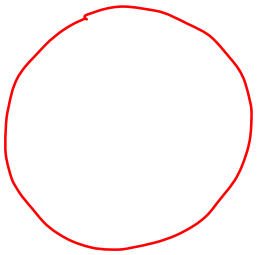
b) According to the isoperimetric quotient, which shape is the weirdest (use a calculator so you can compare the values)? Which is the least weird?

Weirdest is lowest value, which is #2

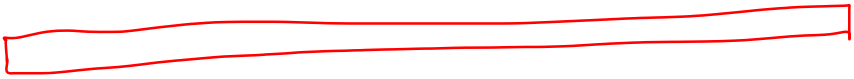
Least weird is #1

Question 4. In each part, draw a single shape having the properties described.

a) High convex hull ratio and high isoperimetric quotient.



b) High convex hull ratio and low isoperimetric quotient.



c) Low convex hull ratio and low isoperimetric quotient.