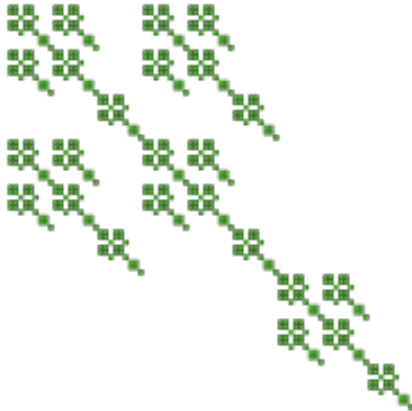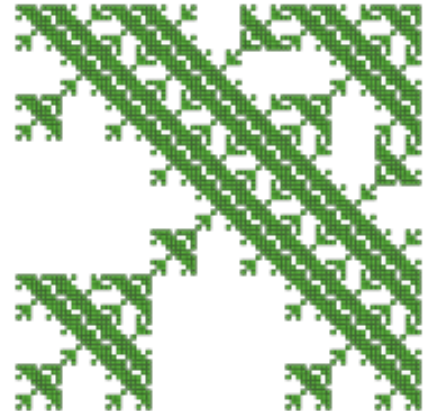Answer the following questions on a separate sheet of paper and turn in your responses by 9:00 am on Wednesday February 23rd.

1. For the following four fractals write down the generating pattern and the next iteration. Hence or otherwise find the fractal dimension of the fractal.
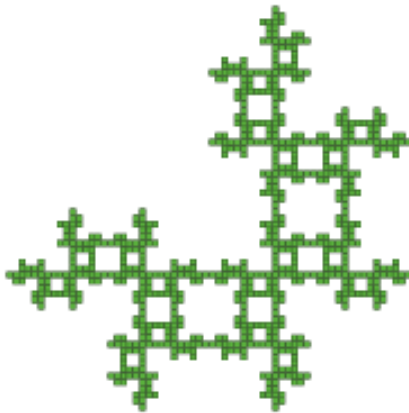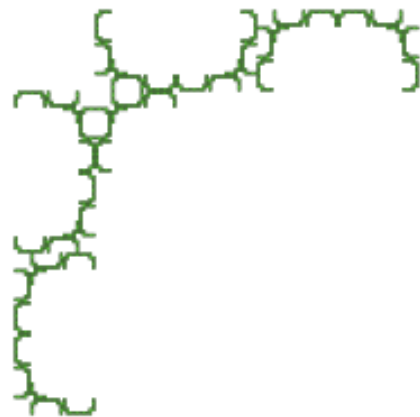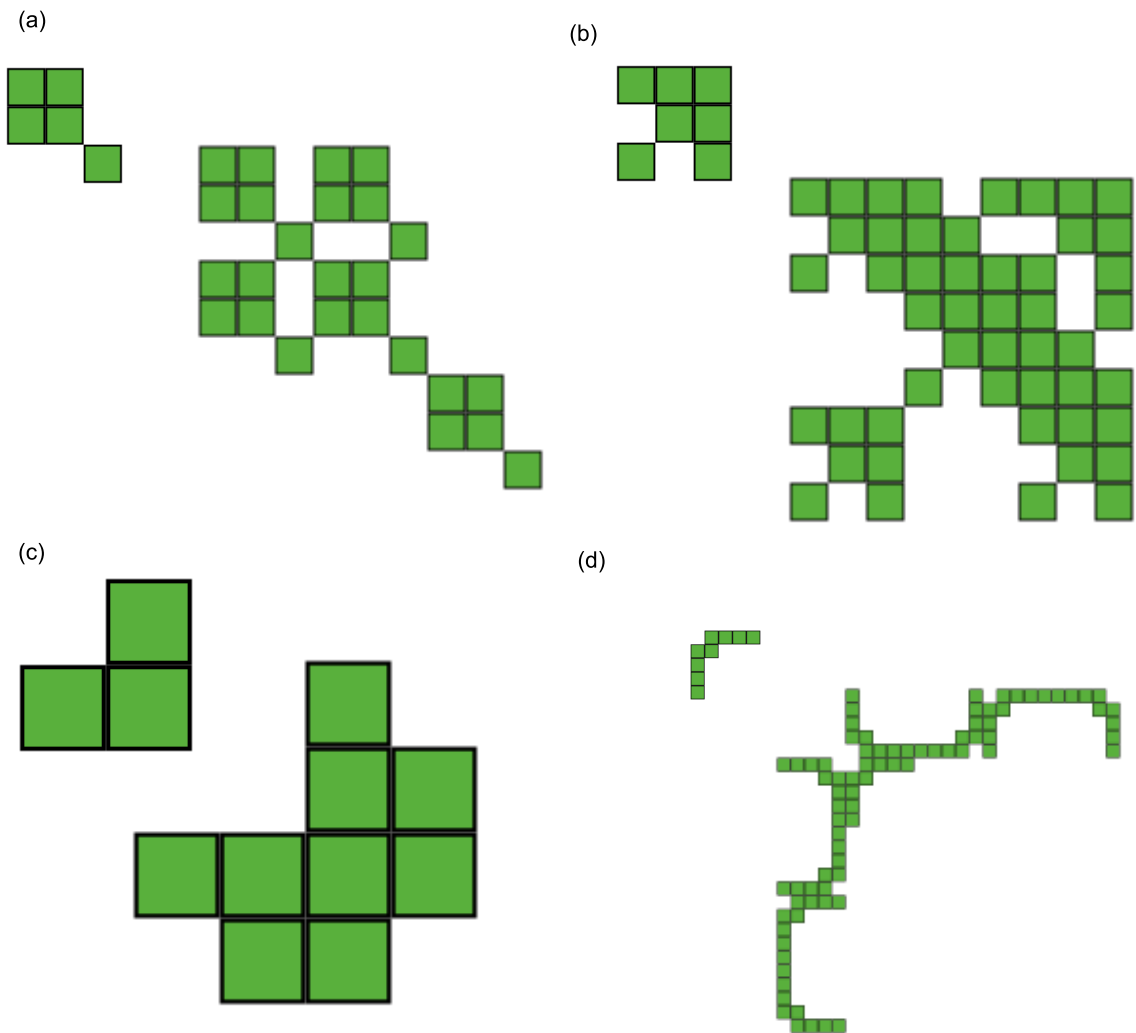
(a)

(b)

(c)

(d)

The generating pattern is shown, scaled down by the appropriate factor along with the next iteration, which shows how the objects are oriented.

(a)

(b)

(c)

(d)

for (a), $m = 3$ and $n = 5$, so $d = \log 5/\log 3 = 1.465$. For (b), $m = 3$ and $n = 7$, so $d = \log 7/\log 3 = 1.771$. For (c) $m = 2$ and $n = 3$, so $d = \log 3/\log 2 = 1.585$. Finally, for (d) $m = 5$ and $n = 8$, so $d = \log 8/\log 5 = 1.292$.

2. Find the fractal dimension of the following fractal curve, called the dragon curve, by using the method of rulers of length 1, $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{8}$. Let the first ruler be the the distance between the ends of the curve.
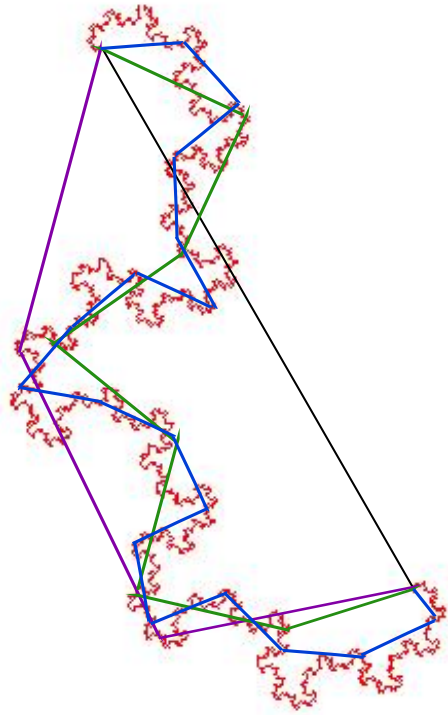
Ruler (x)	Number of rulers (y)	$\log(x)$	$\log(y)$	$-\log(y)/\log(x)$
1	1	0	0	NA
1/2	2.7	-.301	.431	1.43
1/4	6.8	-.602	.833	1.38
1/8	17.5	-.903	1.24	1.38

So the fractal dimension is the average value in the last column, which is 1.40.