I. Anamorphic Art:

Using the two links accompanying this assignment, print out the drawing you're going to convert to anamorphic art (a primitive flower), which is already placed on a perspective grid for you, as well as the straight-on grid you're going to draw the anamorphic version of the flower on.

1. Describe exactly where you should place your eye so that the perspective grid that the flower sits on looks like a square grid.

   Note: If you orient the paper so that the actual parallel lines are horizontal, then you will use a horizon line to do this; if you orient it so that the actual parallel lines are vertical, you will use a "verizon" line.)

   Also note: This is **not** the same as finding where the person who is looking at your final anamorphic version of the flower should view from so that the image they see looks like the original undistorted version.

2. Transfer the drawing of the flower that I provided, which is the drawing as you'd like it to appear to the viewer when viewed from an extreme point of view, to the straight-on grid to create the anamorphic drawing.

   Concepts to take into account:

   - Make sure you've oriented the two grids the same way: if you have 18 "squares" going horizontally on the perspective grid, then turn the straight grid so that 18 squares go across horizontally on that one as well.
   - Recall that intersection points on the two grids correspond exactly, so places where the flower crosses such an intersection point are the most reliable transfer points.
   - Also recall that proportion is preserved on the lines that are still parallel on the perspective grid. For instance, halfway along such a side of a square on the perspective grid corresponds to halfway along the corresponding side of the corresponding square on the straight-on grid. Thus places where

the drawing crosses one of these still-parallel lines are fairly reliable transfer points.

– Proportion is *not* preserved on the lines that are *not* parallel on the perspective grid. Halfway back along a square on the perspective grid corresponds to less than halfway along on the straight-on grid. Places where the drawing crosses one of *these* lines are not reliable transfer points and should be avoided if possible.

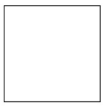
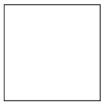
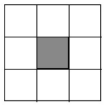
If you want to color your completed anamorphic art, please do!

3. Roughly where should the viewer place their eye (to the left, right, top, or bottom of your drawing?), and at what angle should they look at this picture, so that it looks the same as if you are looking straight at the drawing of the flower I provided?

• Creating Fractals - Recursion

4. *The Sierpinski Carpet*

Using graph paper, carefully draw the figures that result from (at least) the first three steps, with the following recursive replacement rule:

Start with a square  *. Whenever (and wherever) you see a*  *, replace it with a*  *.*

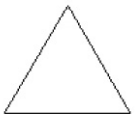
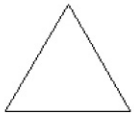
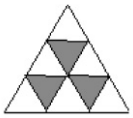
Suggestion: Since you're going to be dividing the sides of your squares into thirds three times, you might want to start with them having length 27, if the squares on your graph paper are small enough.

Note: As with the version of the Sierpinski triangle we created in class, this is actually the negative version of the actual Sierpinski carpet. For the true Sierpinski carpet, you start with a

full colored-in square, and remove the middle ninth at each step, leaving that portion empty.

5. *The Mitsubishi Gasket*

Using graph paper, carefully draw the figures that result after (at least) two steps, with the following recursive replacement rule:

Start with an equilateral triangle  *. Whenever (and wherever) you see a*  *, replace it with a*  *.*

(That is, divide each side into thirds, and use those divisions to divide the equilateral triangle into 9 equal-sized equilateral triangles, 6 of which are right-side up and the interior three of which are upside down. Color in the interior 3.)

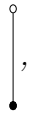
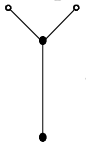
Suggestion: Since you're going to be dividing the side of your triangles into thirds twice, you want to start with them having a length that's a multiply of 9.

Note: This is again the negative version. For the true version, you would again begin with a solid triangle and remove portions at each step.

6. *Tree:*

Using graph paper, carefully draw the figure that results after (at least) five steps, with the following recursive replacement rule:

Start with a line segment with a solid circle on one end and an open circle on the other end. *. Whenever (and wherever) you see*

a  , *replace it with a line segment of the same length, with solid circles on both ends, but with two line segments (roughly) half as long coming out of where the open circle was, each at an angle of* 45° *with the original line segment (if it had continued), so that they're* 90° *apart from each other. These have an open circle on the end.*  .

(The solid and open circles are signals as to which ends are finished and which ends are going to grow. An endpoint that is solid is done growing – any endpoint that is open is still ripe for growth.)

Suggestion: Since you're going to be dividing the length of your line segment in half at least 5 times, you probably want to start with a line segment that's 16 units long (32 would be even better, but unless you have tiny squares, you aren't going to have room for that. Also, this tree grows up and out, so base your initial line segment in the bottom middle of your graph paper).