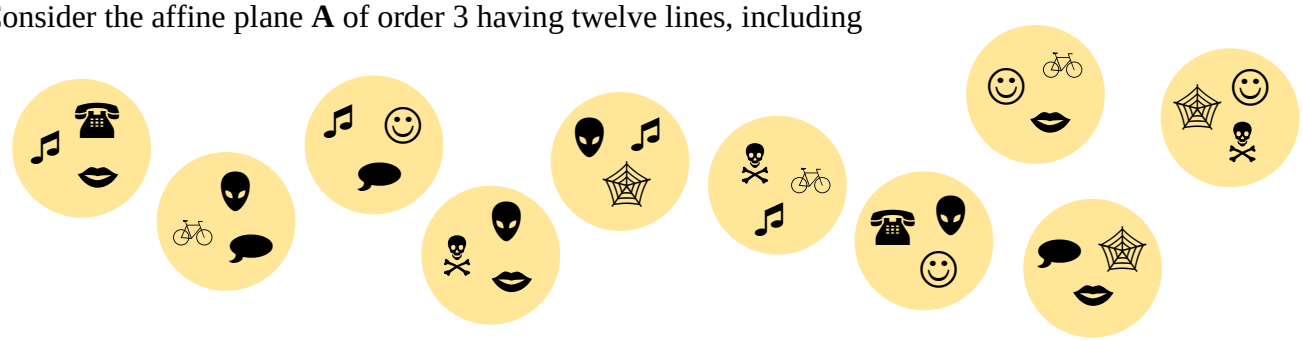
HW1 Due Thursday, September 20, 2018

Consider the affine plane **A** of order 3 having twelve lines, including



and two more lines which you must find. The nine points are the nine distinct dingbats (iconic symbols) shown.

1. Find the missing two lines.

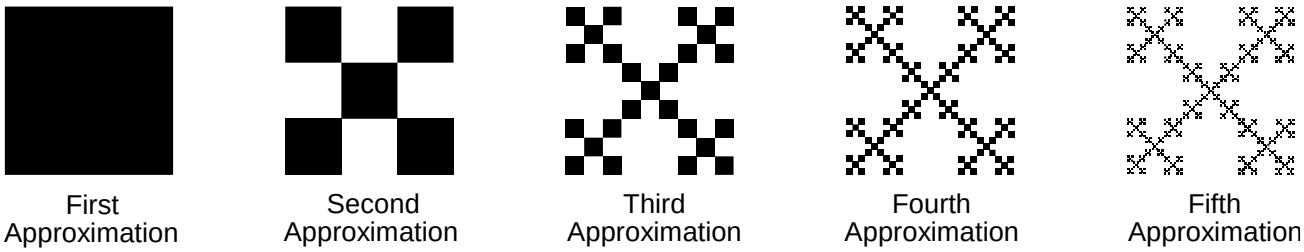
2. A *quadrangle* is a set of four points, no three of which are collinear. According to axiom A3, the plane **A** should have at least one quadrangle.
   a. Give an example of a quadrangle in the plane **A**. (This shows that **A** satisfies A3.)

   b. How many quadrangles does **A** have? Explain your answer.

3. According to axiom A1, the points  and  should lie on a unique line. Which line is it?

4. According to axiom A2, there should be a unique line through the point  which does not intersect the line  . Which line has this property?

5. Consider the fractal plane figure for which the first five approximations are shown. (The fractal is the limit of this sequence of images.)



First Approximation | Second Approximation | Third Approximation | Fourth Approximation | Fifth Approximation

   a. What is the total area of the fractal pattern? Explain.

   b. Compute the Hausdorff dimension of the fractal, with explanation. Give the dimension exactly, and as a decimal approximation correct to four decimal places.