MATH/FA 1020 – Math in Art

Summer 2016

Worksheet 1

Deadline:

If you are submitting this for bonus (Summer 2016 - A01 *only*), it is due on May 11th, 2016.

Objective

The objective of this worksheet is to gain familiarity with the compass and straight edge and to practice some of the Euclidean constructions. The construction lines should still be visible on the page, but should be fainter that the objects you are drawing. You are encouraged to use (translucent) colour to accentuate the objects.

1. Draw some random dots (points) on a page. There should be between 12 and 20 points. Pick them pairwise and construct the bisector. Continue finding bisectors until each point is separated from the other points. (You will not need the bisector for each pair of points, just close ones.)

2. Draw some random lines on the page (these lines should intersect each other.) Pick an angle made by two of the lines and copy it on one of the other lines. Repeat until you have copied around 6 angles. Indicate (using notation or colour, or some other technique) which angle are the same.

3. Draw three lines on the page that form a large triangle. Continue each side until it leaves the page. Select points in each region (there should be 7 of them). Construct a line perpendicular to one of the original 3 lines. Make clear in this drawing which lines are the original 3.

4. Draw some random dots (points) on a page. There should be between 12 and 20 points. Choose triples of points and construct the circle that passes through these points. Continue until each point is in some circle. (Note, some circles may not be entirely contained on the page, this is fine.)

5. Fix your compass to a fairly small radius (around 3cm). Draw a circle with that radius. Keeping the radius fixed, draw a circle centred on the first circle. Continue drawing circles of that fixed radius, using the intersections of former circles as the centres. A pattern will form, fill the page with this pattern.

6. Repeat the technique used for the page 5 drawing. Draw the circles lightly to simply find the intersection points. Join these points to get a pattern of triangle.

7. Repeat the technique used for the page 5 drawing, but using a smaller radius. Draw the circles lightly to simply find the intersection points. Join these points to get a pattern of regular hexagons (a hexagon is a 6-sided figure.)

8. Draw a line that crosses most of the page (it should start and end at the edge of the page, close to opposite corners). Construct points on that line (8-12) that are the same distance apart (this does not need to use the entire line, the points may be only on a portion of the line). Draw a line that passes through one of these points that meets the original line. Construct lines parallel all meeting the original line at the points.

9. Draw 3 line segments on the page. These should be at different angles, and of different lengths. Divide each of these segments into 5 segments of equal length. On each segment number the points that are the ends of the segments, and join them to the similarly labelled points on the other lines.

10. Construct a square that fills most of the page. Construct a circle that 'just fits' inside the square. Construct a square that 'just fits' inside the circle. Repeat the circle square pattern as many times as looks appealing. (For this pattern, only the original square needs to be fully constructed using perpendiculars, etc. Then, if you draw the four lines joining the corners via diagonals and the midpoints to form a T in the middle, the rest of the informations needed for the rest of the objects should be obvious.)