

# MATH 402 Worksheet 6

Friday 10/07/16

A *tessellation* or *tiling* of the plane is covering of the plane by repeated copies of a shape, without gaps and without overlaps.

- (1) A *regular* tessellation is one made from copies of a single regular  $n$ -gon, with neighboring  $n$ -gons having common vertices. Classify all possible regular tessellations of the plane by following these steps. Assume it is possible to tile the plane by regular  $n$ -gons.
  - Determine the angles of a regular  $n$ -gon.
  - Suppose  $k$   $n$ -gons meet at a vertex. What must be the relationship between  $n$  and  $k$ ?
  - Conclude what must  $n$  and  $k$  be.
- (2) Draw all the possibilities for the tessellations in the previous exercise. For each one of them, determine the corresponding group of symmetries.
- (3) A *semiregular* tessellation is one made from copies of two or more regular polygons, such that the configuration around each vertex is the same (up to rotation). Can you classify all semiregular tessellations? At least try the following:
  - Classify all semiregular tessellations that involve only equilateral triangles and squares.
  - Show that there can be no semiregular tessellations with regular pentagons, squares, and triangles.

