Configuration theorems and skewers
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For every n > 2 there is a closed regular polygon in the plane, which means that it is equilateral, and equiangular in that the angle between successive sides is a constant angle. But what if the sides are allowed to flip left or right as long as the polygon closes up. We will show how to enumerate all such equilateral equiangular polygons in the plane. Essentially they correspond to complex algebraic numbers whose minimal polynomials have no non-negative real real roots. These polynomials correspond to the planar critical points of the configuration space of equilateral equiangular polygons, with fixed edge lengths and angle, in 3-space. It is also possible, using rigidity theory, to show that the configuration space of equilateral equiangular polygons in 3- space, with fixed edge length and angle, that are sufficiently close to a regular polygon have at most 2 components.

This is (a very old unpublished) joint work with Beat Jaggi and Robert Jamison.