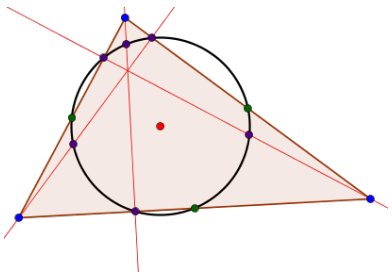
Euclidean Geometry: An Introduction to Mathematical Work

Math 3600, Fall 2013

23 November



More Advanced Constructions

Definition. A circle is said to be *circumscribed* about a figure if the figure lies in the interior of the circle, except for the vertices which lie on the circle.

A circle is said to be *inscribed* in a figure if the circle lies in the interior of the figure and is tangent to each of the sides of the figure.

12.1 Challenge. Construct a circle inscribed in a given triangle ABC. (par 13)

12.2 Challenge. Construct a circle circumscribed about a given triangle ABC. (par 7)

12.3 Challenge. Given a line ℓ, a line segment d and a point O, construct a circle with center O that cuts off a segment from line ℓ which is congruent to d.

12.4 Challenge. Construct three circles such that each pair meets at right angles. (par 10)

12.5 Challenge. Given a segment d, a circle with center O and a point P inside the circle, construct a line through P on which the circle cuts off a segment congruent to d.

When exactly is this construction possible?

12.6 Challenge. Given a segment AB and an angle α and given another segment d, construct a triangle ABC with base equal to AB, angle α at C and such that $AC + CB = d$.

Exactly how often is this construction possible? How many ways can the conditions be met?

12.7 Challenge. Given two circles Γ and Γ' with centers O, O', respectively, construct a line tangent to both circles.

How many such lines are there?