

*Euclidean Geometry:  
An Introduction to Mathematical Work*

*Math 3600*

*Fall 2016*

*Regular Figures, especially the Pentagon*

Read Book IV of the *Elements*. Pay particular attention to propositions 10-12.

**15.1 Problem.** Prepare a presentation of Euclid's construction of a regular pentagon.

**15.2 Problem.** Given a circle, but not its center, construct an inscribed equilateral triangle in as few steps as possible. (par 7)

**15.3 Problem.** Construct a square in as few steps as possible. (par 9)

**15.4 Problem.** Given a line segment  $AB$ , construct a regular pentagon having  $AB$  as a side. (par 11)

**15.5 Problem.** Given a circle  $\Gamma$  and its center  $O$ , construct inside  $\Gamma$  three equal circles, each one tangent to  $\Gamma$  and to the other two. (par 13)

**15.6 Problem.** Let  $ABC$  be an equilateral triangle inscribed in a circle. Let  $D$  and  $E$  be the midpoints of two sides, and extend segment  $DE$  to meet the circle at  $F$  so that  $E$  lies between  $D$  and  $F$ . Show that the rectangle on  $EF$  and  $DF$  has the same content as the square on  $DE$ .

**15.7 Challenge.** Construct a regular hexagon in as few steps as possible. What should the par value be?

