Homework 6 - Math 531, Frank Thorne (thornef@mailbox.sc.edu)

Due Monday, October 29

Perform the following constructions with compass and straightedge. Explain your steps. Briefly explain why your constructions work when not clear (this is a judgement call), but full proofs are not required.

There are a lot of questions, but they are pretty easy and we did most of them in class.

(1) Bisect an angle.

(2) Bisect a given line segment.

(3) Construct an equilateral triangle.

(4) Construct a square.

(5) Construct a regular hexagon.

(6) Draw an arbitrary triangle; then, construct a copy of it.

(7) Draw a segment of a circle; then, find its center.

(8) Given a segment of length 1, construct segments of length $\sqrt{2}+1$, $\sqrt{2}-1$, $5\sqrt{2}$, and $\frac{1}{3}$.

(9) Construct angles of 15, 30, 45, 60, and 75 degrees.

(10) The *golden ratio* is $\frac{1+\sqrt{5}}{2}$. It is often thought that rectangles whose sides are in this proportion are especially pleasing to the eye.

Construct such a rectangle, and judge for yourself.

(11) (Bonus.) Construct a regular 17-gon. Feel free to search the internet, but please explain the construction in your own words.

(12) (Bonus.) Given two points which are far apart, find their midpoint using only a compass.