Assignment 10

1. Prove Theorem 2.8.6 in the notes.
2. Do Exercise 2.8.1 in the notes.
3. Draw a large triangle $\triangle ABC$ on a piece of paper.
   (a) Carefully constructthe perpendicular bisectorsof each of the sidesofthetriangle. Itappearsthatallthreeof theperpendicularbisectorsintersectin onepoint X. Draw acircle centered at X which contains one vertex of the triangle. The circle appears to contain both the other vertices as well.
   (b) Byvaryingtheshapeoftheoriginaltriangle $\triangle ABC$, Canyou causethepoint X to lieeithertheinterior or theexteriorofthe $\triangle ABC$?
4. Now prove the observations made in the previous exercise, as follows:

   Consider an arbitrary triangle $\triangle ABC$ and the perpendicular bisectors of two of the sides. These two lines intersect at a point X. (You may assume this.) Show that the point X is equidistant from the three vertices of the triangle, and conclude that a circle centered at X and containing one of the verticesofthe triangle containsallof the vertices. Also conclude that X lies on the perpendicular bisector of the third side, and therefore the three perpendicular bisectors all intersect at X.
5. Draw a large triangle on a piece of paper. Carefully construct the bisectors of each of the three angles of the triangle. The three lines appear to intersect at one point X. Can you think of a strategy for provingthatthethreeanglebisectorsdoindeedintersectinonepoint?