MATH 392 – Geometry Through History – Quiz 1 – February 19, 2016

Your Name: _____

Assume Postulates I - V of Euclid's *Elements* hold.

(A) (20) Let $ABCD$ be a *parallelogram* (vertices A, B, C, D named counterclockwise around the boundary) with $AB = BC = CD = AD$, so the parallelogram is a *rhombus*. Show that the diagonals $\overline{AC}$ and $\overline{BD}$ *bisect each other* and meet at a right angle. That is, show that if the diagonals intersect at E, then $AE = EC$, $BE = DE$, and $\angle AEB, \angle BEC$, etc are all right angles. Use only facts contained in Book I of Euclid for this.

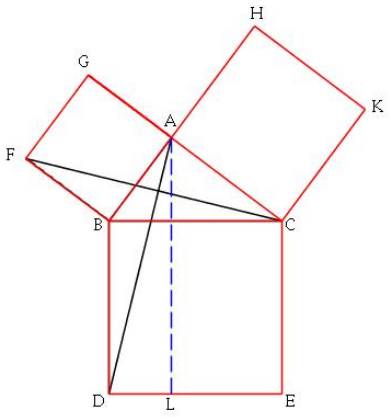

Figure 1: Figure for Proposition 47, Book I

(B) *Extra Credit* (10) Show that if we have the situation of Euclid's Proposition I.47 as in the figure above, then $\overline{AD}$ and $\overline{CF}$ meet at a right angle. For this one, any complete proof is OK; don't feel constrained to argue by only Euclidean methods. Coordinates, vectors, trig, etc. are all legal.