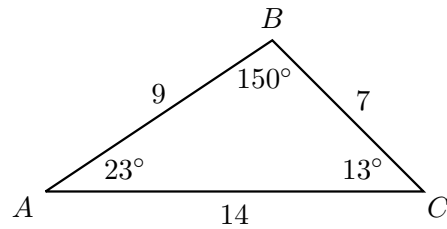*"Might is geometry; joined with art, resistless."*

– Euripides

Problem 1. (10pt) Suppose that triangle $\triangle DEF$ is congruent to the triangle $\triangle ABC$, shown below.

Find the following:

(a) $\angle FED$

(b) $|\overline{FD}|$

(c) $\angle EDF$

(d) $|\overline{DE}|$

(e) $\angle DFE$

(f) $|\overline{EF}|$

Problem 2. (10pt) Does there exist a triangle with sides 5, 6, 12? If not, explain why. If so, construct. Do the same for a triangle with sides 5, 12, 13.

Problem 3. (10pt) A student is given a line segment $\overline{AB}$ and is told to construct the perpendicular bisector to the segment; that is, construct a line segment that is perpendicular to the given line segment that intersects the given line segment at a point C such that $|\overline{AC}| = \overline{BC}|$. The student then performs the following:

- They draw a circle centered at A with radius equal to the length of the line segment.

- They draw another circle centered at B with radius equal to the length of the line segment.

- They find the two intersection points of the circles from the previous two steps and connect them.

The student then claims that the final line segment drawn is the perpendicular bisector of the line segment $\overline{AB}$. Is the student correct? If so, prove that this is the perpendicular bisector. If not, explain what they have done incorrectly.