

MAT 515: Geometry for Teachers
Problem Set 3

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Fall 2019

Problem 1. (4+4 points) A **kite** is a quadrilateral whose four sides can be grouped into two pairs of equal-length sides that are adjacent to each other. Show that:

- a) A quadrilateral is kite if it has an axis of symmetry passing through a vertex.
- b) Diagonals of a kite are perpendicular.

Problem 2. (1+3 points) A triangle ABC is given. Using a compass, construct a segment $A'B'$ congruent to AB on a given line. Then, using a compass, construct a point C' such that $A'B'C'$ is a triangle congruent to ABC .

Problem 3. (5 points)

Prove that if two sides and the median drawn to the first of them in one triangle are respectively congruent to two sides and the median drawn to the first of them in another triangle, then such triangles are congruent.

Problem 4. (5 points) Prove that in a convex pentagon, if all sides are congruent and all diagonals are congruent, then all interior angles are congruent.

Problem 5. (5 points)

On each side of an equilateral triangle ABC , congruent segments AB' , BC' , and CA' are marked, and points A' , B' , and C' are connected by lines. Prove that $A'B'C'$ is also equilateral.

Due Date: Wednesday September 25.