COLLEGE GEOMETRY
HOMEWORK 5

JANET VASSILEV

Due March 5 by 8 a.m.

(1) If you were trying to prove the following theorem, which cases must you consider?
  Consistancy of Triangle Vertices Theorem:
  If $\Delta ABC = \Delta A'B'C'$ as triangles then $\{A, B, C\} = \{A', B', C'\}$.

(2) Give pictorial examples of the following:
  (a) An acute isosceles triangle.
  (b) A right isoscelels triangle.
  (c) An obtuse isosceles triangle.
  (d) An acute scalene triangle.
  (e) A right scalene triangle.
  (f) An obtuse scalene triangle.

(3) Prove the following corollary of Pasch's Theorem: If ΔABC is a triangle and ℓ is a line not containing A, B or C, then either ℓ intersects exactly two sides of ΔABC or none of them.

(4) If ΔABC is a triangle and ℓ is a line, is it possible for ℓ to intersect
  (a) exactly one side of ΔABC?
  (b) exactly two sides of ΔABC?
  (c) all three sides of ΔABC?

(5) If ΔABC is a triangle and ℓ is a line, is it possible for ℓ to intersect
  (a) ΔABC in exactly one point?
  (b) ΔABC in exactly two points?
  (c) ΔABC in exactly three points?
  (d) ΔABC in infinitely many points?

(6) Prove the following: If ΔABC is a triangle and $\overline{DE} \cong \overline{AB}$, then there exists a point F on each side of $\overleftrightarrow{DE}$ with $\Delta ABC \cong \Delta DEF$.

(7) Prove the triangle inequality. (We proved the generalized triangle inequality in class using the triangle inequality.)

(8) Given 4 points maybe not distinct A, B, C, D, determine all cases where $AD = AB + BC + CD$. Think about the proof of the generalized triangle inequality that we did in class.

(9) Prove the Hypotenuse-Leg Correspondence Theorem.