Math 4005 Geometry, Spring 2005
Exercises II

1) [1] Define the following terms: isoceles traingle, equilateral triangle, base angles (of an isoceles triangle).

2) These questions concern the concept of "segment congruence".
   2.1) [1+] What does it mean for two line segments to be congruent? Is this a primitive notion or a defined notion?
   2.2) [2] If your answer to 2) was "primitive", then explain how the concept of segment congruence aquires meaning. If your answer was "defined", then what terms are used in the definition? Upon what primitive terms does your definition ultimately rest?
   2.3) [1] In Euclid, is the concept of segment congruence (Euclid says "equality") primitive or defined?

3) [2] Same as question 2), but for the concept of "angle congruence".

4) Triangle congruence
   4.1) [2] Give a rigorous definition of triangle congruence.
   4.2) [1] State the SAS criterion for triangle congruence.
   4.3) [2+] In most modern axiomatic presentations of plane geometry, SAS appears as an axiom. In Euclid, SAS is "proved" in Proposition 4. A careful reading of the proof offered by Euclid shows that certain assumptions which do not appear in the postulates nor in previously proven propositions are used. Read the proof and describe the assumptions that Euclid has "sneaked in".
   4.4) Prove: Base angles of an isoceles triangle are congruent.
   4.5) [1] State the SSS criterion for triangle congruence. Determine the proposition in which Euclid proves it. Describe Euclid's proof.
   4.6) [3] State the ASA criterion for triangle congruence. Determine the proposition in which Euclid proves it. Describe Euclid's proof.

5) Quadrilaterals
   5.1) [1] Define "quadrilateral".
   5.2) [1] Define congruence of quadrilaterals.
   5.3) [2] Is there an SASA criterion for quadrilateral congruence? Explain. An SSSS criterion? Explain.
   5.4) [3] Find a true criterion for quadrilateral congruence in which the given is not the complete data set SASASASA.