Mathematics 213-A Spring 2002 Quiz 1

0.1 Due February 1, 2002

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Name

Directions: Be sure to include in-line citations, including page numbers if appropriate, every time you use the results of discussion, a text, notes, or technology. **Only write on one side of each page.**
"*Reductio ad absurdum, which Euclid loved so much, is one of a mathematician's finest weapons. It is a far finer gambit than any chess play: a chess player may offer the sacrifice of a pawn or even a piece, but a mathematician offers the game.*" – Godfrey H. Hardy

Discussion Problems

1. (Number 9 page 30 of Greenberg) Can you think of any way to prove from the postulates in chapter 1 that for every line l
   (a) There exists a point lying on l ?
   (b) There exists a point not lying on l ?
2. (Number 12 page 31 of Greenberg) What is the flaw in the 'proof' that all triangles are isosceles?
3. Determine if the following are tautologies.
   (a) $p \Longrightarrow (q \Longrightarrow p)$
   (b) $[p \Longrightarrow (q \Longrightarrow r)] \Longrightarrow [q \Longrightarrow (p \Longrightarrow r)]$
   (c) $(p \vee q) \Longleftrightarrow (\sim p) \wedge (\sim q)$
   (d) $p \wedge \sim p$
   (e) $((p \wedge \tilde{\ } q) \Rightarrow (r \wedge \tilde{\ } r)) \Rightarrow (p \Rightarrow q)$

0.2 Outlined Problems (to be turned in with carefully written proofs)

On this assignment there are no proofs required for the following problem. Merely write out the definitions of the given terms.

1. Look up the definitions of the following geometric terms.
   (a) segment
   (b) endpoints of a segment
   (c) ray
   (d) angle
   (e) supplementary angles
   (f) right angle
   (g) parallel lines
   (h) perpendicular lines
   (i) circle
   (j) radius of a circle
   (k) transversal

0.3 Problems (to be turned in with proofs that your audience will find easy to follow)

1. Recall that a **model** of an axiomatic system is an interpretation of the undefined terms for which all of the axioms make sense and a **theorem** is a statement that can be justified using just the axioms (or previously proven theorems). Use the model 'stacked cups' model of the Scorpling Flug axiomatic system that we presented in class to conjecture an 'unproved', but true, fact about the flugs. Prove your conjecture.