Math 304 - Dr. Miller - Exam #1, Spring 2016 - Monday, Feb. 22, 2016

Work the problems on the blank paper provided, then staple this page to the front.

1. List the four components of an axiomatic system, in any order.
2. Formally state your choice of any ONE of the Parallel Postulates; give its name.
3. (a) In grades K-12 we study Euclidean geometry. What was Euclid's primary contribution to the history of geometry?
   (b) To the nearest 100 years, roughly when did the field of non-Euclidean geometry begin developing?
   (c) Name one person who was involved in this development. (Spelling optional)
4. (a) Name three historical cultures (spelling optional) who studied geometry from a primarily applied perspective - i.e., for issues of dealing with land, taxation, etc.
   (b) Circle any of the cultures you just named that were active in the period after 0AD. If none, name an additional one here that was.
5. Name your choice of two famous Greek mathematicians and point out something they are famous for. (Spelling optional)
6. Prove that Axiom 3 in the list below is independent of the other two. Be clear in pointing out which axioms pass or fail, and briefly why.

   Axiom 1 - There are exactly 3 lines.

   Axiom 2 - Every line is on at least 2 points.

   Axiom 3 - There are exactly 3 points.
7. Consider the following Do-Re Axiomatic system, whose undefined terms are Do's, Re's and "on," and with these axioms:

   - Any two distinct Do's are on a unique Re together.
   - Any two distinct Re's are parallel.
   - Every Re is on at least one Do.
   - There are at least 3 Do's.

   Prove that all Do's are together on the same Re in this system.
8. Determine whether the following interpretations satisfy or fail each Incidence Axiom on the attached sheet, briefly justifying in a sentence or two (no formal proof required).
   (a) Points are (ALL the) letters of the alphabet, lines are also (ALL the) letters of the alphabet, and "on" means one letter is adjacent to another, in either order. Assume that when you reach Z, you start over again with A, so that A and Z are "on" each other.
   (b) Points are (ALL) possible subsets of the positive integers. Lines are the individual positive integers. "On" refers to membership in a set.
9. Which Parallel Postulate(s) does the interpretation in Problem #8a satisfy? Justify informally in a sentence or two.

Incidence Axioms from our text:

IA-1: For each two distinct points, there exists a unique line on both of them.

IA-2: For every line, there exist at least two distinct points on it.

IA-3: There exist at least three distinct points.

IA-4: Not all points lie on the same line.