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

Prepare for the exam by studying the topics below, in conjunction with your notes, text, and graded and ungraded HW problems. You will be more successful if you strive to master the concepts in general, rather than simply memorizing specific examples that we have already done. Studying together is also a plus.

Exam content in our text comes from Chapter 1 only.

Non-Proof Tasks:

1. List the four components of an axiomatic system.
2. Determine whether a given interpretation of its undefined terms satisfies a given set of axioms/is a model.
   (a) Prepare to justify informally, as on HW.
   (b) Prepare for concrete or abstract interpretations.
   (c) Interpretations given by diagrams or charts such as those for Four-Point Geometry or Fano or Young's Geometry are possibilities.
   (d) Fe-Fo Geometry and Incidence Geometry interpretations are also possibilities.
3. List the three undefined terms and the four axioms for Incidence Geometry.
4. List my choice of 1, 2 or all three Parallel Postulates; give their names.
5. Identify which Parallel Postulate(s) a given interpretation of the undefined terms "points," "lines," and "lie on" satisfies. (It is possible to meet more than one: when they're converted to if-then form with a false hypothesis.)
6. State the formal definitions of: intersecting lines, parallel.
7. Isomorphism will not be assessed, nor Geometers' Sketchpad.

Proof Tasks:

1. Given a collection of undefined terms and axioms (and possibly a definition or two), prove theorems in the axiomatic systems created.
   (a) Theorems will be elementary, of a level similar to those in HW and the reading.
   (b) Some theorems will use the "familiar" Fe-Fo Axiomatic System and may even be theorems you have already proved in class, reading, or HW.
   (c) I may also choose from some already stated theorems in our text for Four-Point, Fano's, or Young's Geometries. Either way, those are good sources of practice.
2. Prove - by creating appropriate INFORMALLY explained models - that a given axiom is independent of others in a given set.
   (a) Specifically, your "explained models" should justify as in the Non-Proof Tasks, how in one model ALL axioms are satisfied while in another, the supposed independent one FAILS but all others ARE satisfied.
   (b) Explain (referring to the meaning of *independent axiom*) how completing such a task is an actual proof of independence.

History tasks: (Expect a few "short answer" questions.)

1. Name 3-4 cultures that used geometry in an applied way, and the rough time-frame into which they fit, chosen from: 3000BC-1000BC, 1000BC-0AD, 0AD-1000AD 1000AD-2000AD.
2. In your own words, explain what was new and different about the Greek approach to geometry.
3. Name 3-4 famous Greek mathematicians and the areas of math or the significant life events for which they are famous.
4. Describe in a sentence 1-2 of the things that Euclid did not quite succeed at, based on modern standards.
5. Describe in 2-3 sentences the situation in Western math development right after the Greek influence ended.
6. When was non-Euclidean geometry first developed? Name 2-3 mathematicians who contributed.