Examination 2 (version 2) - Math 141, Frank Thorne (thornef@mailbox.sc.edu)

Wednesday, October 31, 2012

The format and instructions are the same for the practice exam and the real exam.

Instructions. When proving propositions from Euclid, you should write your proofs more or less his style. You don't have to follow him exactly (in particular, you don't need to adopt his somewhat stilted language) but don't use any ideas, concepts, or notation that Euclid didn't use. Also in a proof of Proposition 12 (for example) be sure to only apply the postulates, definitions, common notions, and Propositions 1-11.

Exceptions:

- You may denote equalties and sums of angles in the modern fashion, i.e. $\angle ABC + \angle CBD = \angle ABD$ if BC is a line through angle ABD.
- You may describe triangles as being congruent, and you may refer to the usual congruence criteria (SAS, AAS) etc. by name (**but do not apply them if they haven't been proved yet**).
- You may use "180 degrees" for "two right angles".
- If you come up with a proof not following these rules you will get partial credit. Partial credit will be more generous if you point out where you have deviated from the rules.
- You may take shortcuts, or only consider one case, where Euclid did. (Please say where you are doing so.)

For constructions, use only compass and straightedge. Unless specifically asked for, proofs are not required, but explain each of your steps (i.e. say what you are doing).

You must follow Euclid's rules, *except* that you may freely fix a length with your compass and transfer it elsewhere on your diagram. (You don't need to repeat the construction of Proposition 2, unless a diagram specifically asks you to.)

There are 99 points total, plus one for free.

1. (20 points each) Prove any three of the following propositions: 7, 16, 17, 19, 26. (In 26, prove your choice of one of the two cases described 'either' - 'or'.)
2. (13 points each) Construct any three of the following figures:
   - An angle of 15 degrees.
   - First draw any line segment, and declare its length to be 1. Then, construct a segment of length 1/3.
   - First draw an arbitrary circle. Then inscribe a square in it.
   - A regular hexagon.