

## Study Guide - Math 531, Frank Thorne (thornef@mailbox.sc.edu)

### Exam: Wednesday, October 31

**Euclid:** You will be provided with a printout of the webpage <http://aleph0.clarku.edu/~djoyce/java/elements/bookI/bookI.html>, but not any of the linked pages. This lists all of the definitions, postulates, common notions, and propositions from Euclid.

You will be given five propositions from 1-20, 22, 23, 26-31, and be asked to prove any three of them.

**Constructions.** Be able to construct any of the following using straightedge and compass. Explain what you are doing at every step. Be able to prove that your constructions work (although this won't necessarily be asked.)

Other constructions might appear (anything on HW6 is also fair game), but this covers most of them.

- (1) Bisect an angle or a line segment.
- (2) Draw the perpendicular bisector of a given line segment.
- (3) Given a line  $\ell$  and a point  $P$  on  $\ell$ , draw the perpendicular to  $\ell$  through  $P$ .
- (4) Same as previous question, where  $P$  is not on  $\ell$ .
- (5) Construct a parallel to a line  $\ell$  through a point  $P$ .
- (6) Given a triangle, duplicate it elsewhere on your diagram.
- (7) Construct an equilateral triangle, a square, and a regular hexagon. (Either given a circle to start, in which case the figure should be inscribed, or given one of the edges to start.)
- (8) Given line segments of length  $a$  and  $b$ , construct segments of length  $a + b$ ,  $a - b$ ,  $\sqrt{ab}$ ,  $na$  or  $a/n$  for any positive integer  $n$ , or  $a/b$ . Iterate this procedure; for example, construct a segment of length  $\sqrt{3 + \sqrt{3}}$ .
- (9) Given all or part of a circle, find its center.
- (10) Construct angles of 15, 30, 45, 60, and 75 degrees.