MONT 104Q – Mathematical Journeys: From Known to Unknown
Oral Presentations on Euclid's *Elements*, Book I
September 26, 2015

General Information

On October 5 and October 7, as announced in the course syllabus, you will be doing an oral presentation with a partner (or in one case with two partners). There will be three or four of these each day, so aim for 10 - 15 minutes, with each person in the team contributing to the development and the delivery in class.

The goal of your presentation will be to give the class an overview of one or two of the propositions from the next segment of Book I of the *Elements* and the proof(s), plus the significance of the proposition, how it is similar to or different from something you have seen before in high school, etc. For each assigned proposition below, there are some comments to guide you as you think about what you want to say.

It would be best to do your presentations using either PowerPoint or Prezi since you will need to keep them to a fairly tight time restriction and you don't want to have write a lot on the board during the talk. (If absolutely necessary, a chalk-talk is OK too if you would prefer that, or if you are unfamiliar with either software option.) If you do use the software, please keep distracting "bells and whistles" like slide animations, silly graphics, downloaded images, etc. to an *absolute minimum*. Your presentation should be *about the mathematics*, not about how clever you can get with PowerPoint or Prezi. If you want to include diagrams, but are not sure how to create them, you can consult with me and we can figure out an appropriate way to do that.

Teams and Assigned Propositions

For Monday, October 5:

1) Proposition 29 – Isabel B. and Alex C. This one is *very significant* in the logical development of Book I for a reason you should briefly explain. Make sure you understand and point out the precise relation between Proposition 29 and Proposition 27 from before.

2) Proposition 32 – Katie E. and Brendan E. This one is a very basic and useful fact. It should look very familiar and you may have seen this exact proof before. You will need to mention Proposition 31 (the construction of parallel lines) – but don't try to prove that one too. But pay careful attention to how that is used and how Proposition 29 comes into it.

3) Proposition 33 – Lizzie F. and Alex G. This is an important fact that implies key facts about parallelograms that will be used repeatedly later on. Be sure you understand how earlier results like Propositions 27 and 29 are being used.

4) Propositions 35 and 36 – Jack H. and Callan H. You should state and prove 35 and then mention that the next thing Euclid does is 36 (state it, but it's not necessary to prove that one). It is important to realize that these statements are really about *the areas of the parallelograms*. We would express this with an area formula that implies the statement is

true. But Euclid does not have the notion of a numerical measure for area (like a number of square inches). So he has to resort to showing that the parallelograms can be cut up into regions that are congruent. It's not necessary to fill in the details about the other cases that Euclid doesn't consider. But you should mention that his proof works only in one particular case and ignores the others.

For Wednesday, October 7:

(1) Propositions 39 and 40 – Audrey H. and Michael M. You should state and prove 39 and then mention that the next thing Euclid does is 40 (it's not necessary to prove that one). It is important to realize that these statements are really about *the areas of the triangles.* We would express this with a an area formula that implies the statement is true. But Euclid does not have the notion of a numerical measure for area (like a number of square inches). So he has to resort to showing that the triangles can be cut up into regions that are congruent. It's not necessary to fill in the details about the other cases that Euclid doesn't consider. But you should mention that his proof works only in one particular case and ignores the others.

(2) Proposition 41 – Mary M. and Paolo P. The special case where the triangle is formed by a diagonal of the parallelogram is "obvious." But be aware and point out that the statement here is much more general. Your proposition uses the ideas from 35,36,39,40 so be sure you look at those too and understand how they are being used.

(3) Proposition 46 – Frank S., Francois V. and Zack W. Since you are the only 3-person group, I'm going to ask you to do a bit more than the others. I'd like you to give the statement and proof of this proposition, then say something about the following question: Which regular polygons can be constructed using the methods Euclid presents in Book I? We know the equilateral triangle can be constructed from Proposition 1. This proposition gives a construction of the square. There are some comments about further cases treated later in the *Elements* in the version from David Joyce's web site. Look those up and if you're feeling ambitious, see if you can understand how the simplest one works.