

1 Homework

The first part of this assignment is *directed reading*. The second part is a brief *writing exercise*. A final part are some more traditional homework problems.

Reading:

The first part is about Book 1 of Euclid's Elements. For this part, please use the version of the elements linked to from the course website.

(The link is: <https://mathcs.clarku.edu/~djoyce/java/elements/bookI/bookI.html>)

To start, look at the **definitions** in Book 1 of Euclid. Read the first few carefully, and get a feel for the others, by for example randomly clicking on a few and skimming them. Next, read all 5 **postulates**, and think about each for a little bit. Think about postulate 5 in particular, and read the commentary provided on the above website. Next, look at the 5 **common notions**, and think about each for a little bit. Next, think about the first few **propositions**, and randomly click on a few others to get a feel for this part. Finally, read the guide at the bottom of Book 1 (for the part about logical dependencies, you need only skim it.)

Now, read section 1.2 of your "Four Pillars" book. Some of this is review from lecture, but pay special attention to the proof the book gives for why the triangle in Figure 1.4 is equilateral. Also, think about and make sure you understand the division into "construction axioms", "geometric axioms", and "logic". And, make sure to note the phrase "Euclid states no axiom about the intersection of circles, so he has not justified the existence of the point C used in his very first proposition!"

Now, read Proposition 4 of Euclid, and the accompanying commentary. Pay special attention to the phrases "It is not clear what is meant by "superposing a triangle on a triangle" means" and "whatever the intended meaning of superposition may be, there are no postulates to allow any conclusions based on superposition."

Finally, look at Section 2.9 of your "Four Pillars" book. Read the first four paragraphs. Then, skip ahead to the section titled "Hilbert's axioms". Reflect on the difference between the very first paragraph here, particularly the word "undefined", and Euclid's definitions. Read and think about the first 4 axioms, and very briefly skim the rest; note that there are now axioms about construction as well.

Writing: Write a one paragraph response, about some of your thoughts from the above reading. This will be graded essentially for completeness, so there is no "right answer" that I am looking for here.

Traditional problems:

Exercises 1.2.1, 1.3.3, 1.3.5 from the “Four Pillars” book.

1.2.1 and 1.3.3 are straight edge and compass constructions; make sure you make all the steps you are doing in your construction clear. (You might want to say Step 1, Step 2, etc.) You can use an actual straightedge and compass, or the software on the website, or you can hand draw the figures; it is the steps that I am interested in. While your constructions should be correct, you do **not** need to **prove** that they are. Exercise 1.3.5 does not require a straight edge and compass – just a good explanation.