

Project 1: Axiomatic Systems and Constructions

The purpose of this problem set is to make connections and apply the material. You may work alone or in a group of 2 people and turn in one project writeup. Be sure to show work and explain your reasoning in your own group's words. In addition, be sure to acknowledge any sources outside me or your group, like "The insight for this solution came from a conversation with Joel."

1. 1.4 #4 on p. 31 with the model at the top of p. 32 (Geometric Perspectives)

Be sure to explain your reasoning in your own words as you answer the three questions. There is a discussion of parallel, defined as nonintersecting lines, on p. 29 and parallel axioms on p. 30.

2. Angle Bisector (Interactive Geometry Software and Proof Considerations)

- Follow Construction 4.9.4 on p. 210 to construct an angle bisector in an Interactive Geometry Software with only straightedge, compass, and intersection features. To make things easier, I recommend selecting s to have the same length as \overline{PQ} .
- Measure the angles to show they are equal.
- Move one of the points to ensure you have constructed an angle bisector for a wide range of examples.
- Select one view of your construction and measurements to turn in as part of your eventual PDF. You can electronically print to a PDF, take a screen shot, physically print your work, or collate it in other ways.
- Use the calculator key to view your script/commands, which you will turn in. You can either handwrite the commands, print or screenshot them to a PDF, or convert them to a PDF in another way.
- 4.9 #8 on p. 219. Write your own rigorous proof in paragraph form with your justifications and individualized phrasing. You may refer to Euclid's definitions, postulates, common notions, and up through I-8.
- Are there any additional underlying assumptions you needed in your proof?
- Later in the semester we will look at the application of this construction in other geometries as well as its limitations. For a different type of application, briefly, how can I-9 be applied to prove I-10?

3. 1.1 # 2 on p. 5 (Geometric Perspectives and Proof Considerations)

- Follow the instructions in the book for (i) and (ii) and show work/reasoning.
- The Babylonians explored right triangles in other ways too. Research a scholarly peer-reviewed source that includes information about Plimpton 322, a Babylonian cuneiform clay tablet, and read through it. It may be hard to tell at first glance what is a scholarly peer-reviewed work. For example, some articles, webpages and books may not have gone through a rigorous peer-reviewed process themselves. They may be a great starting place for information aimed at a general audience, and for other sources themselves. Some items are inappropriate sources for your citations. For example, Wikipedia notes: "because it can be edited by anyone at any time, any information it contains at a particular time could be vandalism, a work in progress, or just plain wrong" (accessed 6 December 2021 https://en.wikipedia.org/wiki/Wikipedia:Wikipedia_is_not_a_reliable_source). The library can help you with research or with identifying scholarly peer-reviewed sources, like <https://appstate.libcal.com/appointments/RAP>
 - List the scholarly peer-reviewed source in a scholarly format of your choice.
 - Summarize a major takeaway about Plimpton 322 in your own words.

4. Proper citations, partners name (if any), look back, collate to one PDF:

- (a) Regardless of whether you talked to others or used other sources, be sure that your project consists of products that you and your partner (if any) create yourselves and in your own words. Give proper credit to anyone you talked to, other than if you are turning this in with a partner or talked to me, and give proper credit to any source citations. If this doesn't apply or you already completed this above, then write a smiley face, N/A, or similar.
- (b) If you are turning this in with a partner, list both your names in 4b) and turn in one complete project writeup in one of your ASULearn assignments. If not, write a smiley face or similar.
- (c) Take the time to reflect and ensure that you have answered all parts of the questions, showed work, and explained your reasoning in your own group's words. A good rule of thumb in deciding how much to write is to write enough so that a classmate who hasn't yet solved the problem could understand what you are doing and why—how you reached your conclusion from the computation or example—so they are persuaded of its validity by the logic and clarity of your reasoning. Brief annotations rather than full sentences are fine, except if indicated otherwise like in a paragraph proof.
- (d) Collate your work into one PDF for submission to the ASULearn assignment. Electronically, you can append PDFs you create from GeoGebra to the end of your other PDFs, like by using Preview on a Mac or PDFsam on a PC. Or, if you are physically printing, you can print your GeoGebra work and then append it to the end of handwritten work and then scan it all in to one file. If you have a phone or tablet, apps like Adobe Scan or CamScanner can work well to scan work to one full size multipage PDF. You can also use many printers or photo copiers to scan to PDFs—the school library lists that as an option and they can help:
<https://library.appstate.edu/services-search/print-zone-tech-help>.