# Worksheet on Axiomatic Systems and Constructions 2

goals:                 Dr. Sarah's MAT 3610: Introduction to Geometry

- IGS Exploration
  I can use Interactive Geometry Software (IGS) to discover relationships and demonstrate they seem to apply in a wide variety of examples.

- Proof Considerations
  I can write rigorous proofs in geometry, identify underlying assumptions, and understand limitations and applications.

- Geometric Perspectives
  I can compare and contrast multiple geometric perspectives.

**Welcoming Environment:** Keep it a safe place to express meaningful ideas and opinions. Actively listen to others and encourage everyone to participate. Part of the welcoming environment is to keep an open mind as you engage in our class activities, explore consensus and employ collective thinking across barriers. Maintain a professional tone, show respect and courtesy, and make your contributions matter.

1. **Building Community**: What are the preferred first names of those sitting near you? If you weren't able to be there write N/A or give reference to anyone you had help from.

   **I-11 Construction and Application to the Perpendicular Bisectors of a Triangle**
2. Which congruence theorem was key in the proof of I-11 to show that we had constructed a perpendicular in the axiomatic systems and constructions 2 interactive video?
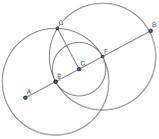
   

   I-11 Construction
3. Open GeoGebra Geometry.
   - Begin with a triangle $ABC$ made from the segment tool.
   - Use the built in features of the IGS under Construct to construct the three perpendicular bisectors of $\overline{AB}, \overline{AC}$, and $\overline{BC}$.

   Notice that the three perpendicular bisectors seem to meet at one point. Drag the vertices of the triangle to explore where/when they meet and find a relationship between where the bisectors intersect and a geometric measurement of the triangle. What kind of triangles, if any, have the perpendicular bisectors meeting inside the triangle? Outside the triangle? On one of the sides of the triangle?

4. Next, construct a circle with center at the intersection of the bisectors and radius at one of the vertices of the triangle. Do all the vertices of the triangle seem to lie on this circle?

## Wile E Coyote Axiom System

5. Discuss and then respond to the following...

   I keep having a recurring nightmare where I am trapped in the following axiom system:

   - A1: Coyotes and roadrunners live on the surface of a perfectly round planet.
   - A2: Coyotes only begin chasing roadrunners exactly 2 seconds after the roadrunner passes them.
   - A3: Coyotes can only catch roadrunners if they can catch up to them after having chased them.
   - A4: Roadrunners run faster than coyotes.
   - A5: Coyotes stop chasing roadrunners when they disappear from view.
   - A6: All coyotes have 20/20 vision.

   Will I be able to catch the roadrunner in this axiom system? If needed, can you add other axioms to the system, which are consistent with A1 through A6, that will ensure that I will always catch the roadrunner? Help me—you're my only hope!

   Hungry as ever,

   Wile E. Coyote

6. **Help each other and PDF responses to ASULearn**: If you are finished with the worksheet before I bring us back together, first ensure that your entire group is finished too, and if not, help each other. If your entire group is finished, then split up and pull up chairs so that you can discuss your responses with other groups. Collate your handwritten responses, preferably on this handout, into one full size multipage PDF for submission in the ASULearn assignment. I recommend you turn it in sometime today, but you have until the next class.