Worksheet on Congruence and Similarity 2

Dr. Sarah's MAT 3610: Introduction to Geometry

goals:

- 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.

Congruence and Similarity in Euclidean Triangles

2. Work (no internet searches) to look for counterexamples, if they exist. You may use IGS. Fill with "y" "yes" if the congruence or similarity theorem always applies or, if not, include a rough sketch of a counterexample of two triangles that violate the statement. Here, A=angle, S=side, H=hypotenuse, L=leg of a right triangle. Some may be the same as those nearby, so you can write "same as SSA" or similar.

	congruence?	if not, then similarity?
AAA		
AA		
SAS		
SSS		
SSA		
SS		
SA		

ASA		
AAS		
HL		

3. If you listed yes for any congruences above, add the related propositions from Euclid's *Elements* Book 1 from among I-4, I-8, I-26, and I-47.

4. In the video, we tested out the similarity assumption for geometric modeling that lift grows linearly in weight for winners from the 1976 Olympics by their weight lifting class. Some researchers suggest instead that muscle strength may be proportional to cross sectional area. This would suggest that:
   lift $\propto$ muscle strength $\propto$ area $\propto$ length^2.
   We can relate this to weight that is in the Excel file as follows:
   weight = volume $\times$ density $\propto$ volume (if we assume a constant average density) $\propto$ length^3.
   So muscle strength $\propto$ length^2 and weight $\propto$ length^3 (so length $\propto$ weight$^{\frac{1}{3}}$). Use this to solve for x: muscle strength $\propto$ weight^x (hint: the power x will be fractional).

5. When I test this new model in Excel, the new model's r^2 value is .9469. Recall that the original model's r^2 value was .9295. Which is a better model?

6. Discuss whether there any other models you can think of testing or other underlying issues we might consider? Write down an item relating to your discussion.

7. In the video we explored counterexamples to similarity in quadrilaterals. First review. Then continue to investigate (no internet searches)—can any set of 5 pieces give quadrilateral congruence? Discuss with your group and then provide 5 pieces for congruence or write down an item you found interesting.

8. **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.