Fall 2016/MA 314   HW 1: Metric spaces go the distance!

Geometry is a subject full of wonderful problems and interesting methods drawn from all quarters of mathematics. Some of the problems below are just intended to cement basic concepts or give practice with basic calculations, while others are intended to require substantial insight and even, occasionally, cleverness.

Remember that, although you are encouraged to work together, all of your write-ups must be your own (no copying someone else's solution - not even with minor wording changes.) **List the names of everyone you worked with on the HW!** You are encouraged to **not** look online for solutions - your time is better spent wrestling with the proof yourself or getting help from the professor, than squandering it online. Remember to follow the formatting requirements for your Also, the readings for the week are listed below for convenience, but you should look at the reading assignment webpage to see what the day-by-day reading (and reading response) schedule is.

Special Note: This assignment is *length*-ier than usual due to the non-standard beginning to the semester.

1. READING

- The handout "Introduction to Metric Spaces" available on the course webpage.
- The handout "Metric Space Techniques" available on the course webpage.
- Bonahon: Preface; Sections 1.1 - 1.4; Appendix T.2
- Schwartz: Sections 2.1 - 2.4
- Watch the TED talk on crocheting hyperbolic planes. (It is 16 minutes 43 sec. long) We'll talk about this later.

2. TO DO

(1) Do all the exercises and prove all the theorems in the "Introduction to Metric Spaces" handout. You also need to fill in the details for proofs which are only partially completed. Attempting the challenge problem may result in extra-credit.

(2) Do all the exercises and prove all the theorems in the "Metric Space Techniques" handout *except for those in section 4.2 (Quotient semi-metrics)*. You also need to fill in the details for proofs which are only partially completed.