Problem Set 7 **Set Theory & Topology** **Due 4/13/20**

You are expected to do the following problems to a high standard (i.e., at least well enough to be published in a textbook) for full credit. Five of these problems will be selected (by Jon) for grading, with each worth 4 points.

1. Consider $\mathbb{R}$ with the topology consisting of intervals of the form $(-a, a)$ for $a \in \mathbb{R}^+$, which we call the Hammar topology. Is the Hammar topology T_0? T_1? T_2?.
2. Consider $\mathbb{R}$ with the $\mathscr{H}$ topology. Is this space T_0? T_1? T_2?
3. [Baker 7.1.5] Prove that the T_2 property is a topological property.
4. Suppose that X is a T_0 space. Give an example to show that $X \times Y$ need not be a T_0 space.
5. [Baker 7.1.8] Prove that if X is a T_1-space and $A \subseteq X$, then A is a T_1-space.