Problem Set 6 **Set Theory & Topology** **Due 4/11/22**

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. Four of these problems will be selected (by Jon) for grading, with each worth 5 points.

1. [Baker Exercise 7.1.13] Let X be a T_1 space. Prove that if A is a finite subset of X, then A does not have a limit point.

2. [Baker Exercise 7.1.14] Let X and Y be topological spaces and let $f : X \to Y$ be a function. The *graph* of f is the set $G(f) = \{(x, y) \in X \times Y : y = f(x)\}$. Prove that if f is continuous and Y is a T_2-space, then $G(f)$ is a closed subset of the product space $X \times Y$.

3. [Baker Exercise 8.2.9] Let (X, d) be a metric space. Show that the function $e : X \times X \to \mathbb{R}$ given by $e(x, y) = \min\{1, d(x, y)\}$ is a metric for X.

4. [Baker Exercise 8.2.10] Show that the metric topology induced by the metric e given in Exercise 9 is the same as the metric topology induced by d.