Problem Set 5 **Set Theory & Topology** **Due 4/22/22**

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. Prove Theorem 8.1.9: Let (X, d) be a metric space and let $U \subseteq X$. Then U is open with respect to the metric topology iff for each $x \in U$, there exists $r > 0$ such that $B_r(x) \subseteq U$.
2. [Baker 8.R.1] If X is any set, then there is a metric d for X.
3. [Baker 8.R.10] If X is a discrete topological space, then X is metrizable.
4. [Baker 8.R.11] If X is an indiscrete topological space, then X is metrizable.