Problem Set 5 **Set Theory & Topology** **Due 3/26/18**

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 5.3.4] Complete the proof of Lemma 5.3.1 by showing that the function f is continuous.
2. Find an open cover of (a, b) in $(\mathbb{R}, \mathscr{U})$ which does not have a finite subcover.
3. [Baker 6.1.10] Let $(X, \mathscr{T})$ be a topological space and let $A \subseteq X$. The set A is compact iff every cover of A consisting of $\mathscr{T}$-open subsets of X has a finite subcover.
4. [Baker 6.1.16] Every bounded infinite subset of $(\mathbb{R}, \mathscr{U})$ has at least one limit point.