Spring 2017

M367K Topology I

Problem set #2

Due: Friday, February 3rd.

Relevant chapters in Munkres: Chapter 2

1. (10 pts) Pg. 83, #1.
2. (10 pts) Pg. 83, #7.
3. (10 pts) Pg. 83, #8(a).
4. (10 pts) An *arithmetic progression* in $\mathbb{Z}$ is a set

$$A_{a,b} = \{\ldots, a-2b, a-b, a, a+b, a+2b, \ldots\},$$

with $a, b \in \mathbb{Z}$ and $b \neq 0$. Prove that the collection of arithmetic progressions

$$\mathcal{A} = \{A_{a,b} | a, b \in \mathbb{Z} \text{ and } b \neq 0\}$$

is a basis for topology on $\mathbb{Z}$.

5. (10 pts) An *open half plane* is a subset of $\mathbb{R}^2$ in the form $\{(x, y) \in \mathbb{R}^2 | Ax + By < C\}$ for some $A, B, C \in \mathbb{R}$ with either A or B nonzero. Prove that open half planes are open sets in the standard topology on $\mathbb{R}^2$ as defined in class.