1. Munkres 13.8

2. Munkres 18.1

3. Munkres 18.7a

4. Munkres 18.9

5. Let Y_d be a topological space with the discrete topology. What are the continuous maps are from $\mathbb{R}$ to X_d? From $\mathbb{R} - \{0\}$ to X_d? Prove your claims.

6. If $f : X \to Y$ is a map between topological spaces, we say that f is **open** if $f(U)$ is open for every open set in X. Suppose $f : X \to Y$ is an open continuous map.

a) Show that f is a homeomorphism if and only if f is bijective.

b) Show that if f is surjective, and if $\mathcal{B}$ is a basis for X, then the collection $\{f(B) : B \in \mathcal{B}\}$ is a basis for Y.

c) Challenge: Find a map from $\mathbb{R}^2$ to $\mathbb{R}^2$ that is open but not continuous.

7. Let $f : X \to Y$ be continuous and let $\mathcal{B}$ be a basis for X. Let $f(\mathcal{B})$ denote the collection $\{f(B) : B \in \mathcal{B}\}$. If f is surjective and open, prove that $f(\mathcal{B})$ is a basis for Y.