Math 205 **HW 9/5**

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1. Do problem 6 (only parts (a) and (b)) from Section 2.2 in "Topology: A first course"

2. Let $(X, \mathcal{T})$ and $(Y, \mathcal{T}')$ be topological spaces. A function $f : X \to Y$ is called *continuous* if $f^{-1}(U') \in \mathcal{T}$ for every $U' \in \mathcal{T}'$. (in words: if the preimage of every open set is an open set).

   (a) Suppose $\mathcal{T}'$ is generated by the basis $\mathcal{B}'$. Prove that f is continuous if and only the following condition holds: $f^{-1}(B') \in \mathcal{T}$ for every $B' \in \mathcal{B}'$ (in other words, show that you only need to check continuity on a basis!):

   (b) Let X be a set with the discrete topology. Characterize all continuous functions $f : X \to \mathbb{R}$, where $\mathbb{R}$ has the usual topology.

   (c) Let X be a set with the indiscrete topology. Characterize all continuous functions $f : X \to \mathbb{R}$, where $\mathbb{R}$ has the usual topology.