

## Additional Problems Assignment 14

1. In class we showed that  $(\mathbb{R}, \mathcal{U})$  has a countable base and  $(\mathbb{R}, \mathcal{H})$  does not.
  - (a) Show that  $(X, \mathcal{T})$  and  $(Y, \mathcal{S})$  are topological spaces and  $f : X \rightarrow Y$  is a homeomorphism and  $\mathcal{B}$  is a base for  $\mathcal{T}$  then  $\{f(B) : B \in \mathcal{B}\}$  is a base for  $\mathcal{S}$ .
  - (b) Show that having a countable base is a topological property.
  - (c) Show that  $(\mathbb{R}, \mathcal{U})$  and  $(\mathbb{R}, \mathcal{H})$  are not homeomorphic.