Name:

Problem 1: *Consider the function* $h\colon \mathbb{R} \to \mathbb{R}$ *given by*

$$h(x) = \begin{cases} 2 & \text{if } x \geq 0, \\ -2 & \text{if } x < 0, \end{cases}$$

where here $\mathbb{R}$ *is given the standard topology. Prove that* h *is not continuous.*

Solution: Consider the open set $(1, 3) \subset \mathbb{R}$. Then $h^{-1}((1, 3)) = [0, \infty)$, which is not open. Therefore h is not continuous.