Morales

MA 538

Fall 2021

HOMEWORK 4

10. Let X be an arbitrary topological space. Suppose for each $x \in X$,

$$\bigcap \{\overline{U_x} : U_x \text{ is a nbh of } x\} = \{x\}$$

Prove that $\Delta = \{(x, x) : x \in X\}$ is closed in $X \times X$.

11. Let X, Y be metric spaces and let $f, g : X \to Y$ be continuous functions. Let $h : X \to Y \times Y$ be a function defined by $h(x) = (f(x), g(x))$. Show that h is also continuous.

12. Let $K = \{(x, y) : x^2 + y^2 = y\}$. Let h be a function defined from $\mathbb{R}$ to K so that $h(t)$ is the point where the line segment from $(t, 0)$ to $(0, 1)$ meets K. Show that h is continuous.

DUE : SEPTEMBER 23, 2021