Extra Credit Assignment 11

Due Thursday, November 12, 11:59 PM

Give $\mathbb{R}^2$ and $\mathbb{R}$ the standard topology.

(a) Show that the "multiplication" function

$$m : \mathbb{R}^2 \to \mathbb{R}, \qquad (x_1, x_2) \mapsto x_1 x_2$$

is continuous.

(b) Show that the "addition" function

$$m : \mathbb{R}^2 \to \mathbb{R}, \qquad (x_1, x_2) \mapsto x_1 + x_2$$

is continuous.

(c) Prove that any polynomial function $\mathbb{R} \to \mathbb{R}$ is continuous. That is, if $f(x) = \sum_{i=0}^{n} a_i x^i$ for some choice of n and $a_0, \ldots, a_n$, prove that f is continuous.