Algebraic and Geometric Methods
in Engineering and Physics

Homework 3

Due on October 12

1. Let $\mathbb{R}[x]$ be the set of polynomial functions in $\mathbb{R}$.

   (a) Show that $(\mathbb{R}[x], +, \cdot)$ is a commutative ring, where $+$ and $\cdot$ are the usual pointwise sum and multiplication of functions.

   (b) Find the group $\mathbb{R}[x]^*$ of units of $\mathbb{R}[x]$.

   (c) Are there any divisors of zero in $\mathbb{R}[x]$?

2. (a) Compute the order of $\mathbb{Z}_{187}^*$.

   (b) Find the multiplicative inverse of $[18] \in \mathbb{Z}_{187}$.