

MATH 111

Homework 9

1. The purpose of this homework is to understand how we defined of *addition* better and to define *multiplication* on \mathbb{N} . Follow the below steps using our steps in *addition* as reference.
2. A set X is **multiplicative** if
 - (a) $(x, 0, 0) \in X$ for any $x \in \mathbb{N}$,
 - (b) if $(x, y, z) \in X$ then $(x, s(y), x + z) \in X$ for any x, y, z .
Give five examples of multiplicative sets.
3. Show that the collection of all multiplicative subsets on \mathbb{N}^3 is a set using *ZF* axioms. Call this set as S .
4. Show that $\bigcap S$ is a multiplicative set. It is the smallest multiplicative set. Call it G .
5. Show that G is a graph set. i.e. for any $(x, y) \in \mathbb{N}^2$ there is a unique $z \in \mathbb{N}$ s.t. $(x, y, z) \in G$.
6. Define multiplication.
7. Show that $x.0 = 0$ and $x.s(y) = x.y + x$ for any $x, y \in \mathbb{N}$.