MATB24. Quiz #1, TUT # 0021

(1) (3 point) In each part, give a complete definition, or mathematical characterization of the word in bold.
   (a) a **identity** of a binary operation x

(2) (6 point) Give an example of a mathematical object that satisfies all the described properties or explain why such an example does not exists.

   (a) A non-zero vector in a vector space V over $\mathbb{F}$ where $\mathbb{F} = (\mathbb{R}, +, \cdot)$ that is it's own inverse.
   Hint 1: The field is defined to be real numbers for a reason.
   Hint 2: Try doing question 3 first and using the result.

(3) (6 point) Carefully prove the following statement.
   (a) Let V be a vector space. Prove that, if $\mathbf{v} \in V$ and r is a scalar and $r\mathbf{v} = \mathbf{0}$, then either $r = 0$ or $\mathbf{v} = \mathbf{0}$.