**Question 1:** Let \( n \geq 2 \) be an integer. Let \( \mathbb{Z}/n \) be the set \( \{0, 1, 2, \ldots, n-1\} \). We define two binary operations + and \( \cdot \) on \( \mathbb{Z}/n \) as follows. If \( a, b \in \mathbb{Z}/n \), then \( a + b \) is defined to be the element \( 0 \leq c < n \) such that \( a + b \) and \( c \) differ by a multiple of \( n \).
Similarly, \( a \cdot b \) is defined to be the element \( 0 \leq d < n \) such that \( a \cdot b \) and \( d \) differ by a multiple of \( n \). For example, if \( n = 5 \) then \( 3 + 4 = 2 \), \( 2 + 3 = 0 \), \( 2 \cdot 4 = 3 \), and \( 4 \cdot 4 = 1 \).
Prove that \( (\mathbb{Z}/n, +, \cdot, 0, 1) \) is a ring. Show that if \( n \) is composite, then \( \mathbb{Z}/n \) is not a field.

**Question 2:** Suppose \( (L, +, \cdot, 0, 1) \) is a field and \( K \) is a subfield of \( L \). Then we obtain a function \( \bullet : K \times L \to L \) sending \( (k, \ell) \) to \( k \cdot \ell \). Prove that \( (L, +, \bullet, 0) \) is a \( K \)-vector space.