Definition 1. A field \mathbb{F} is a nonempty set \mathbb{F} , along with two binary operations, addition + and multiplication cdot, satisfying the following axioms.

- 1. Additive Closure: For all $a, b \in \mathbb{F}, a + b \in \mathbb{F}$.
- 2. Additive Associativity: For all $a, b, c \in \mathbb{F}$, (a + b) + c = a + (b + c).
- 3. Additive Identity: There exists an element $0 \in \mathbb{F}$ such that for all $a \in \mathbb{F}, a+0=a$.
- 4. **Additive Inverse:** For every $a \in \mathbb{F}$, there exists an element $-a \in \mathbb{F}$ such that a + (-a) = 0.
- 5. Additive Commutativity: For all $a, b \in \mathbb{F}$, a + b = b + a.
- 6. Multiplicative Closure: For all $a, b \in \mathbb{F}$, $a \cdot b \in \mathbb{F}$.
- 7. Multiplicative Associativity: For all $a, b, c \in \mathbb{F}$, $(a \cdot b) \cdot c = a \cdot (b \cdot c)$.
- 8. Multiplicative Identity: There exists an element $1 \in \mathbb{F}$ such that for all $a \in \mathbb{F}$, $a \cdot 1 = a$.
- 9. **Multiplicative Inverse:** For every non-zero element $a \in \mathbb{F}$, there exists an element $a^{-1} \in \mathbb{F}$ such that $a \cdot a^{-1} = 1$.
- 10. Multiplicative Commutativity: For all $a, b \in \mathbb{F}$, $a \cdot b = b \cdot a$.
- 11. **Distributive Property:** For all $a, b, c \in \mathbb{F}$, $a \cdot (b + c) = (a \cdot b) + (a \cdot c)$.

Definition 2. A field \mathbb{F} is an *oredered field*, if there exsits a subet $P \subseteq \mathbb{F}$ such that:

- 1. Additive Closure Positives: For all $a, b \in P, a + b \in P$.
- 2. Multiplicative Closure Positives: For all $a, b \in P, a \cdot b \in P$.
- 3. **Positive or Negative:** For all non-zero $a \in \mathbb{F}$, either $a \in P$ or $-a \in P$ but never both.