

**Definition 5.4.** [\[1ZH\]](#) (Solved on 2022-11-15) A field  $F$  is a ring in which multiplication is commutative, and every element  $x \in F$  with  $x \neq 0$  has an inverse  $x^{-1}$  for multiplication.

(So  $F \setminus \{0\}$  is a commutative group for multiplication, see [\[203\]](#)).