Math 151

Set
binary operation $+$
associativity: $\forall a, b, c,\ a + (b + c) = (a + b) + c$
add. identity: $\exists 0$ s.t. $\forall a,\ a + 0 = 0 + a = a$
add. inverse: $\forall a \exists -a$ s.t. $a + (-a) = (-a) + a = 0$

group

commutativity: $\forall a, b,\ a + b = b + a$. . . . .

abelian group

binary operation $\cdot$
associativity: $\forall a, b, c,\ a(bc) = (ab)c$
distributivity: $\forall a, b, c,\ a(b + c) = ab + ac,\ (a + b)c = ac + bc$
mult. identity: $\exists 1$ s.t. $\forall a,\ a1 = 1a = a$ . . . . . .

ring

commutativity: $\forall a, b,\ ab = ba$. . . . . .

comm. ring

$ab = 0 \Rightarrow a = 0$ or $b = 0$ . . . . . .

integ. domain

$0 \neq 1$
mult. inverse: $\forall a \exists a^{-1}$ s.t. $aa^{-1} = a^{-1}a = 1$. . . . . .

field