Math 151

Set
binary operation $+$
$\forall a, b, c, \quad a + (b + c) = (a + b) + c$
there exists 0 s.t. $\forall a, \quad a + 0 = 0 + a = a$
$\forall a$ there exists $-a$ s.t. $a + (-a) = (-a) + a = 0$

$\left.\rule{0pt}{3em}\right\}$ group

$\forall a, b, \quad a + b = b + a$

$\left.\rule{0pt}{5em}\right\}$ abel. group

binary operation $\cdot$
$\forall a, b, c, \quad a(bc) = (ab)c$
$\forall a, b, c, \quad a(b + c) = ab + ac, \quad (a + b)c = ac + bc$

$\left.\rule{0pt}{6em}\right\}$ ring

$\forall a, b, \quad ab = ba$

$\left.\rule{0pt}{6em}\right\}$ comm. ring

there exists 1 s.t. $\forall a, \quad a1 = 1a = a$

$\left.\rule{0pt}{7em}\right\}$ comm. ring with identity

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

$\left.\rule{0pt}{7em}\right\}$ integ. domain

$\forall a$ there exists a^{-1} s.t. $aa^{-1} = a^{-1}a = 1$

$\left.\rule{0pt}{8em}\right\}$ field