

Properties of Real Numbers

INSTRUCTIONS: Assume that $a, b,$ and c are real numbers. Decide whether each statement is TRUE or FALSE. TRUE means that the statement is true *for all real numbers*. FALSE means that there is *at least one set of real numbers that makes it false*. If the statement is FALSE, give a counterexample (show some numbers that make it false).

(1) $a(b + c) = ab + ac$

(9) $a \div (b \div c) = (a \div b) \div c$

(2) $a + b = b + a$

(10) $\frac{0}{a} = 0$

(3) $(a - b)c = ac - bc$

(11) $(a + b)c = ac + bc$

(4) If $a = b$, then $a + c = b + c$.

(12) $a - b = b - a$

(5) $a - (b - c) = (a - b) - c$

(13) $a \cdot b = b \cdot a$

(6) $a \cdot \frac{1}{a} = \frac{a}{a} = 1$

(14) If $a = b$, then $ac = bc$.

(7) $-a = (-1)(a)$

(15) $\frac{a}{0} = 0$

(8) If $a = b$, then $1 = b - a$.

(16) $(a - b)c = a - bc$

$$(17) a \div b = b \div a$$

$$(25) (-a)(-b) = ab$$

$$(18) a \cdot 1 = a$$

$$(26) a(b + c) = ab + c$$

$$(19) \text{ If } a = b, \text{ then } a - b = 0.$$

$$(27) \text{ If } a = b, \text{ then } 1 = \frac{b}{a}.$$

$$(20) a + (-a) = 0$$

$$(28) a + 0 = a$$

$$(21) a(-b) = -ab$$

$$(29) a \cdot 0 = 0$$

$$(22) a(bc) = (ab)c$$

$$(30) a + (b + c) = (a + b) + c$$

$$(23) \text{ If } ab = bc, \text{ then } a = c.$$

$$(31) (a + b)c = a + bc$$

$$(24) (ab) \div c = (a \div c)(b \div c)$$