

# CH 5 Inequalities

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inequality: statement about real num (bool)

## 1 Rules 5.1 of inequalities

(1) If  $x \in \mathbb{R}$  then either  $x > 0$  or  $x < 0$  or  $x = 0$  (only one is true)

(2) If  $x > y$  then  $-x < -y$

(3) If  $x > y$  and  $c \in \mathbb{R}$ , then  $x + c > y + c$

(4) If  $x > 0$  and  $y > 0$ , then  $xy > 0$

(5) If  $x > y$  and  $y > z$  then  $x > z$

rule 3 implies rule 2

see pg 32 proofs

important:  $x \leq y$  proof modulus — as abs

See: Arithmetic-Geometric Mean Inequality:

if  $n$  is a positive integer and  $a_1, \dots, a_n$  are positive reals, then

$$(a_1 a_2 \dots a_n)^{\frac{1}{n}} \leq \frac{1}{n}(a_1 + a_2 + \dots a_n)$$

LHS is geometric mean, RHS is arithmetic mean