# MATH 6: HANDOUT 26
# SOLVING EQUATIONS AND INEQUALITIES

## SOLVING INEQUALITIES INVOLVING NEGATIVE NUMBERS

Today we discussed inequalities and their solutions, discussing how one solves inequalities involving negative numbers. The rule here is

$$a < b \iff (-a) > (-b)$$

(note that the sign of inequality is reversed!). For example, $3 < 5$, but $-3 > -5$.

More generally, if we multiply or divide both sides of an inequality by a negative number, we need to change the sign of inequality, replacing $<$ by $>$ and vice versa. For example, to solve $-3x > -6$, we divide both sides by $-3$ and change $>$ to $<$, giving $x < 2$.

## PRODUCTS

The following rules are frequently used when dealing with equations or inequalities where the left-hand side is a product of two factors:

- A product of two numbers is zero if and only if one of them is zero:

$$ab = 0 \iff (a = 0) \text{ OR } (b = 0)$$

- A product of two numbers is positive if and only if both numbers are positive or both numbers are negative:

$$ab > 0 \iff (a > 0 \text{ AND } b > 0) \text{ OR } (a < 0 \text{ AND } b < 0)$$

- A product of two numbers is negative if and only if one of numbers is positive and the other one is negative:

$$ab < 0 \iff (a > 0 \text{ AND } b < 0) \text{ OR } (a < 0 \text{ AND } b > 0)$$