1.5 Solving inequalities

An inequality is of the form

$$Ax + B \geq C$$

Ex: $3x - 8 \leq 5x + 3$

Reminder: compound inequality

$\underbrace{a < x} < b$ means same as $a < x$ **and** $x < b$

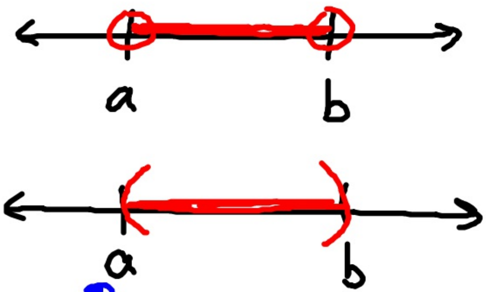
read "x is between a and b"

$x > a$ and $x < b$

"intersection"

i) Open-interval: (a, b) interval notation

all real numbers between a and b excluding endpoints a and b



graph

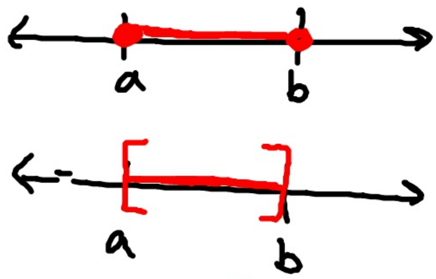
left endpoint

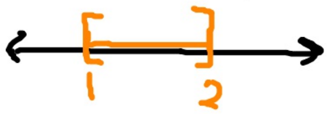
right endpoint

$$a < x < b$$ inequality

② closed interval: $[a, b]$

all real #s between a and b, <u>including</u> endpoints a and b.



<u>Ex:</u> $[1, 2]$ 

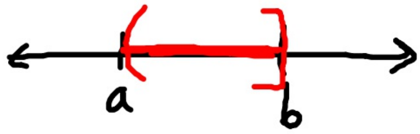
$$a \le x \le b$$

③ Half-open, half-closed.

$[a, b)$

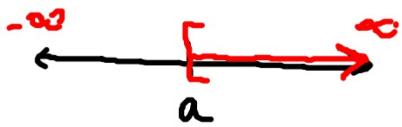
$a \leq x < b$

$(a, b]$



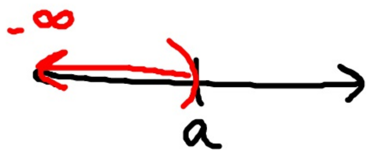
$a < x \leq b$

$[a, \infty)$



$x \geq a$

$(-\infty, a)$



$x < a$

Ex: Write the solution using interval notation and graph.

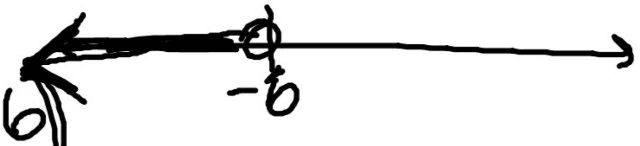
① $-1.3 \le K < \frac{5}{2}$

$[-1.3, 2.5)$

② $m \le -2.6$

$(-\infty, -2.6]$

③ $-6 > x$



$(-\infty, -6)$

Properties for inequalities

① Non-negative property: $a^2 \geq 0$

② Addition/Subtraction property

If $a > b$, then $a + c > b + c$

If $a > b$, then $a - c > b - c$

③ Multiplication/division property

If $a > b$, then $a \cdot c > b \cdot c$ true only if

If $a > b$, then $\frac{a}{c} > \frac{b}{c}$ c is positive

$5 \geq 1$

If $a > b$, then $a \cdot c < b \cdot c$

if c is negative

<u>Ex:</u> $(-1)\ 5 > 3\ (-1)$

$-5 < -3$

Reciprocal properties recip. $\frac{a}{b}$ is $\frac{b}{a}$

① If $a > 0$, then $\frac{1}{a} > 0$

② If $a < 0$, then $\frac{1}{a} < 0$

③ If $\frac{1}{a} > 0$, then $a > 0$

④ If $\frac{1}{a} < 0$, then $a < 0$.

Ex: $\frac{2}{3} > 0$, $\frac{3}{2} > 0$