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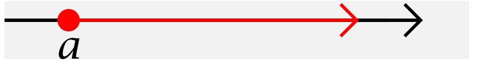

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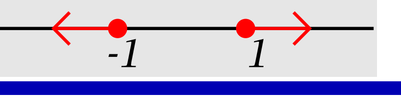

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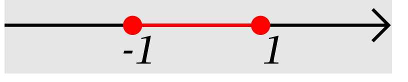

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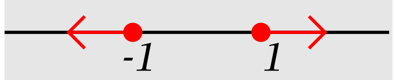

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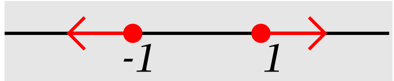

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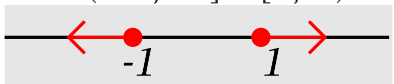

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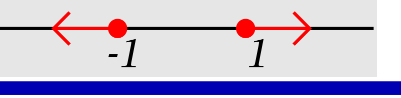

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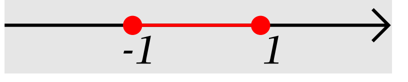

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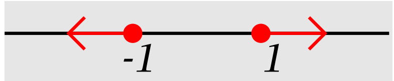

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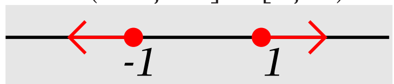

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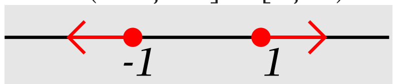

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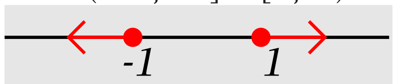

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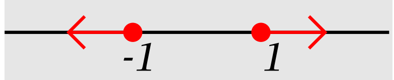

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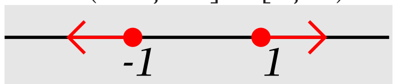

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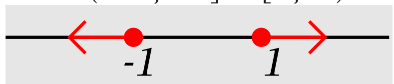

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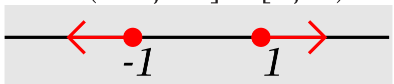

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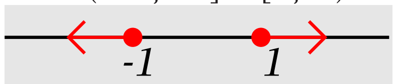

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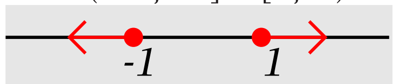

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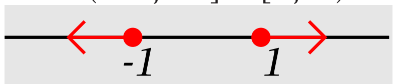

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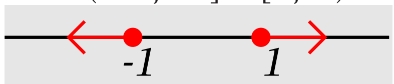

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Intervals-4

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$\{x|\frac{1}{3}3x > 6\frac{1}{3}\} =$

$\{x|x > 2\} =$ $(2, \infty)$.

Solution Sets

We shall often wish to write the set of numbers that satisfy an inequality in interval notation.

Example 1: "Solve $3x + 5 > 11$"

To do this, we can work in two different ways:

Equivalent Inequalities $3x + 5 > 11 \iff$

$3x + 5 + (-5) > 11 + (-5) \iff$

$3x > 6 \iff$

$\frac{1}{3}3x > 6\frac{1}{3} \iff$

$x > 2$

which has solution set $(2, \infty)$.

Set Equations $\{x|3x + 5 > 11\} =$

$\{x|3x + 5 + (-5) > 11 + (-5)\} =$

$\{x|3x > 6\} =$

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Example 2: "Solve $4 - 3x \leq 7 + 2x$"

Again we can work in at least two different ways:

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$\left\{x|x \geq -\frac{3}{5}\right\} = \left[-\frac{3}{5}, \infty\right)$.

or we can vary the order of algebraic operations:

Equivalent Inequalities

$4-3x \le 7+2x \iff$

$4-3x+(-2x) \le 7+2x+(-2x) \iff$

$4-5x \le 7 \iff$

$4+(-4)-5x \le 7+(-4) \iff$

$-5x \le 3 \iff$

$-\frac{1}{5}(-5x) \ge -\frac{1}{5}3 \iff$

$x \ge -\frac{3}{5}$

which has solution set $\left[-\frac{3}{5},\infty\right)$.

Set Equations

$\{x|4-3x \le 7+2x\} =$

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we should realize that it has two different possible meanings, and we should write down the one we really mean.

Correctly Chained Inequalities:

$a < b < c$ $\quad$ $a \leq b < c$ $\quad$ $a < b \leq c$ $\quad$ $a \leq b \leq c$

$a > b > c$ $\quad$ $a \geq b > c$ $\quad$ $a > b \geq c$ $\quad$ $a \geq b \geq c$

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Equivalent Inequalities | **Set Equations**

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Solution by Equivalent Inequalities

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$3x - 5 < 7 \quad \Longleftrightarrow \quad \| \text{ OR } \| \quad 2x - 1 > 13 \quad \Longleftrightarrow$

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Solution by Equivalent Inequalities

$3x - 5 < 7$	$\iff$	OR	$2x - 1 > 13$	$\iff$
$3x - 5 + 5 < 7 + 5$	$\iff$	OR		

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$3x - 5 < 7$	$\iff$	OR	$2x - 1 > 13$	$\iff$
$3x - 5 + 5 < 7 + 5$	$\iff$	OR	$2x - 1 + 1 > 13 + 1$	$\iff$

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$3x - 5 < 7$ $\iff$		OR		$2x - 1 > 13$ $\iff$
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$3x < 12$ $\iff$		OR		

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$3x - 5 + 5 < 7 + 5$	$\Longleftrightarrow$	OR	$2x - 1 + 1 > 13 + 1$	$\Longleftrightarrow$
$3x < 12$	$\Longleftrightarrow$	OR	$2x > 14$	$\Longleftrightarrow$

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$3x < 12$	$\iff$	OR	$2x > 14$	$\iff$
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$x < 4$		OR		

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$3x - 5 < 7 \iff$	OR	$2x - 1 > 13 \iff$
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$x < 4$		OR	$x > 7$	

which has solution set $(-\infty, 4) \cup (7, \infty)$.

Example 4: "Solve $3x - 5 < 7$ OR $2x - 1 > 13$"

Solution by Equivalent Inequalities

$3x - 5 < 7$	$\iff$	OR	$2x - 1 > 13$	$\iff$
$3x - 5 + 5 < 7 + 5$	$\iff$	OR	$2x - 1 + 1 > 13 + 1$	$\iff$
$3x < 12$	$\iff$	OR	$2x > 14$	$\iff$
$\frac{1}{3}(3x) < \frac{1}{3}(12)$	$\iff$	OR	$\frac{1}{2}(2x) > \frac{1}{2}(14)$	$\iff$
$x < 4$		OR	$x > 7$	

which has solution set $(-\infty, 4) \cup (7, \infty)$.