

4.2 Solving Linear Inequalities

A Interval Notation

- (a,b) means $a < x < b$ (x is greater than a and is less than b)
- $[a,b]$ means $a \leq x \leq b$ (x is greater or equal to a and is less or equal to b)
- $(a,b]$ means $a < x \leq b$ (x is greater than a and is less or equal to b)
- (a,∞) means $x > a$ (x is greater than a)
- $(-\infty,a]$ means $x \leq a$ (x is less or equal to a)

Ex 1. Complete the following table.

Inequality Notation	Solution Set Notation	Interval Notation	Solution Set Graph
$-2 \leq x < +3$			
	$\{x \in R \mid x \leq -3\}$		
		$(-4, \infty)$	

B Inequalities

The inequality symbols: $<$ (*less*), \leq (*less or equal to*), $>$ (*greater than*), \geq (*greater or equal to*), and \neq (*not equal to*) are used to create *inequalities*.

The *solution set* is the set of all numbers that make the inequality a *true statement*.

Ex 2. Verify if the given number is a solution for the given inequality.

- a) $-2x + 1 < 0$, $x = 0$
- b) $x - 2 < x^2$, $x = 2$
- c) $\frac{3-x}{x} < -3$, $x = -1$

C Inequality properties

The inequality $a < b$ is equivalent to:

- (i) $a + c < b + c$
- (ii) $ac < bc$, for $c > 0$
- (iii) $ac > bc$, for $c < 0$

Ex 3. Solve each inequality.

- a) $-2x + 3 < 5 - 3x$
- b) $2 - 3(x - 1) \geq 2(3 - x) - 4$

<p>Ex 4. Solve each inequality.</p> <p>a) $\frac{x}{2} \geq \frac{1}{4} + \frac{x}{3}$</p> <p>b) $x^2 - 1 \leq (x+1)^2$</p>	<p>c) $(x+2)^2 > (x-2)^2$</p> <p>d) $(1+x)^2 - (1-x)^2 \geq 1$</p>
<p>D Simultaneous (Double) Inequality</p> <p>The <i>simultaneous inequality</i> $a < x \leq b$ is equivalent to:</p> $a < x \text{ and } x \leq b$ <p>c) $\frac{x}{2} \geq \frac{x}{3} \geq 1 - x$</p>	<p>Ex 5. Solve each inequality. Graph the solution set.</p> <p>a) $4 > 2(x+3) > 0$</p> <p>b) $x+1 \leq 7 - 2x < -x+6$</p>
<p>Ex 6. Solve each inequality. Graph the solution set.</p> <p>a) $x \leq x+1 \leq x-2$</p> <p>b) $x+2 \geq x+1 \geq x$</p>	<p>c) $0 \leq x+1 \leq -2$</p> <p>d) $1 \geq \frac{x}{2} - 3 \geq 1$</p>

Reading: Nelson Textbook, Pages 207-212

Homework: Nelson Textbook, Page 213: #1e, 2f, 3, 4cf, 5e, 6f, 7f, 9, 12, 15, 17