

### Interval Notation

$\infty$  means infinity. Infinity  $\infty$  is NOT a number; you cannot do arithmetic with  $\infty$ .

Infinity  $\infty$  is a concept that means “can grow large without bound.”

$-\infty$  “negative infinity” means “can grow large negative without bound.”

We use  $\infty$  as the right endpoint in interval notation when the interval has no number as its upper bound.

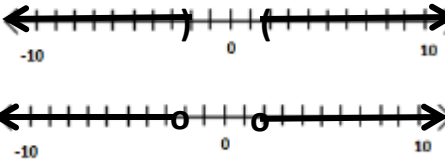
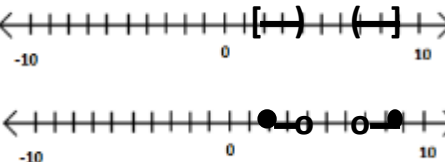
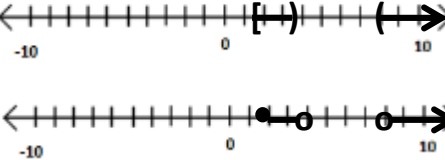
We use  $-\infty$  as the left endpoint in interval notation when the interval has no number as its lower bound.

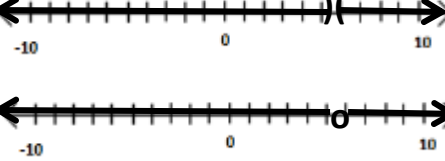
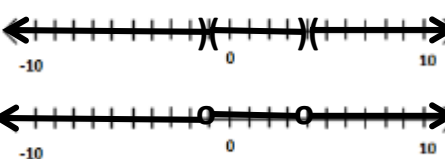
The words “such that” mean “that satisfy the following conditions or conditions” and are often denoted using the symbol | or:

Parentheses indicate that the endpoint of the interval is not included in the interval. Parentheses correspond to $>$ and $<$ symbols. An “endpoint” of $\infty$ or $-\infty$ always has a parentheses	Set notation using Inequalities	Interval Notation	Graph of the interval
	$\{x: x > -2\}$	$(-2, \infty)$	
	$\{x: x < 0\}$	$(-\infty, 0)$	
	$\{x: 1 < x < 5\}$	$(1, 5)$	
	The set of all real numbers	$(-\infty, \infty)$	

<p>Square brackets indicate that the endpoint of the interval is included in the interval. Square brackets correspond to <math>\geq</math> and <math>\leq</math> symbols.</p>	Set notation using Inequalities	Interval Notation	Graph of the interval
	$\{x: x \leq 5\}$	$(-\infty, 5]$	
	$\{x: x \geq 7\}$	$[7, \infty)$	
$\{x: -3 \leq x \leq 9\}$	$[-3, 9]$		

<p>One endpoint included and one endpoint excluded.</p>	Set notation using Inequalities	Interval Notation	Graph of the interval
	$\{x: -3 < x \leq 9\}$	$(-3, 9]$	
$\{x: -3 \leq x < 9\}$	$[-3, 9)$		

A variable may be in one of several intervals, the intervals can be joined (united) using a union symbol, $\cup$ , which means OR mathematically.	Set notation using Inequalities	Interval Notation	Graph of the interval
	$\{x: x < -2 \text{ or } x > 2\}$	$(-\infty, -2) \cup (2, \infty)$	
	$\{x: 2 \leq x < 4 \text{ or } 7 < x \leq 9\}$	$[2,4) \cup (7,9]$	
	$\{x: 2 \leq x < 4 \text{ or } x > 8\}$	$[2,4) \cup (8, \infty)$	

A union symbol can be used to unite two or more intervals that have a "hole" of a single number in-between them.	Set notation using Inequalities	Interval Notation	Graph of the interval
	$\{x: x \neq 6\}$	$(-\infty, 6) \cup (6, \infty)$	
	$\{x: x \neq -1 \text{ and } x \neq 4\}$ is the same as the set $\{x: x < -1 \text{ or } -1 < x < 4 \text{ or } x > 4\}$	$(-\infty, -1) \cup (-1, 4) \cup (4, \infty)$	

Adapted from: Bloom, R. (2007). *Interval Notation*. Retrieved May 21 2013, from Interval Notation:

<http://nebula.deanza.edu/~bloom/M49A/M49AIntervalNotation.pdf>