Review: Identify the following sets of real numbers by definition and special symbol (if there is one)

Natural Numbers counting numbers $\{1,2,3,\ldots\}$ $\mathbb{N}$

Prime Numbers only factors are 1 and the # itself

Integers positive and negative whole #'s $\{\ldots -3,-2,-1,0,1,2,\ldots\}$ $\mathbb{Z}$

Rational Numbers can be written as fractions terminating and repeating decimals $\{p/q \mid p,q \in \mathbb{Z}\}$ $\mathbb{Q}$

Irrational Numbers non-terminating, non-repeating decimals

Real Numbers all decimal #'s all rational & irrational #'s $\mathbb{R}$

1.1 Real Numbers (cont.)

variables - letter (or other symbol) that represents any number that makes sense in the expression

$x+2=3$; $\frac{\text{☺}-1}{\text{☺}+2}$

$a < b$ ($b > a$) "a is less than b"

$a > b$ ($b < a$) "a is greater than b"

$a \leq b$ "less than or equal to"

$a \geq b$ "greater than or equal to"

additive identity = 0

leaves whatever you add it to the same

Formally, the number zero (0) such that $X+0=X$, $0+X=X$ for all real #s X.

additive inverse the real # $-X$ such that

$X+(-X)=0$, $(-X)+X=0$, $X \in \mathbb{R}$

absolute value makes things positive

$$|X| = \begin{cases} X, & X \geq 0 \\ -X, & X < 0 \end{cases}$$

e.g. $|-2| = 2 = -(-2)$

Ways to write sets

Roster method – list

$\{1,2,3,\ldots\}$; $\{\ldots -2,-1,0,1,2,\ldots\}$; $\{a,b,c\}$

Set-builder notation

$\{\text{variable(s)} \mid \text{condition on variables}\}$

(such that)

$\{\frac{p}{q} \mid p,q \in \mathbb{Z}\}$; $\{x \mid x \leq 2\}$

Interval Notation

$[a,b]$ closed interval — includes endpoints

(a,b) open interval — does not include endpoints

$(a,b]$ half-open, half-closed

$[a,b)$ "cloper"

$\mathbb{N}$, $\mathbb{Z}$, $\mathbb{Q}$, $\mathbb{R}$ acceptable way to write these sets

$\mathbb{R} = (-\infty, \infty)$

* ∞ is not actually a number so it is never included!

$\emptyset$ = the "empty set" = the set that contains no elements

$\{\emptyset\}$ = the set containing the empty set as an element

Union and Intersection

$\cup$ "or"

all elements of all sets together in one (larger) set

$\cap$ "and"

where sets overlap

consists only of elements that occur in every single set

$A = \{1,2,3,4,5\}$; $C = \{6,7,8\}$

$B = \{4,5,6,7\}$

$A \cup B = \{1,2,3,4,5,6,7\}$

$A \cap B = \{4,5\}$

$B \cup C = \{4,5,6,7,8\}$

$A \cap C = \emptyset$; $A \cup B \cup C = \{1,2,3,4,5,6,7,8\}$

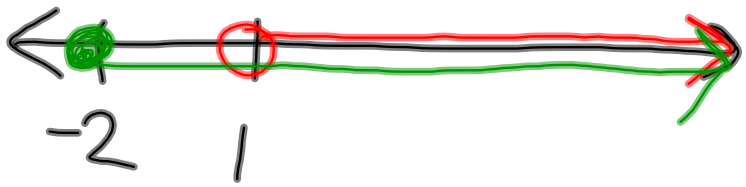
$(A \cap B) \cup C = \{4,5,6,7,8\} = B \cup C$

$A \cup \emptyset = A$

$B \cap \emptyset = \emptyset$

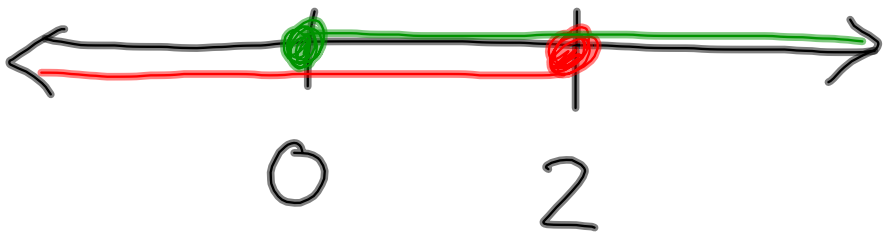
1.1

77. $\{x|x>1\} \cap \{x|x\geq -2\}$



$= \{x|x>1\}$

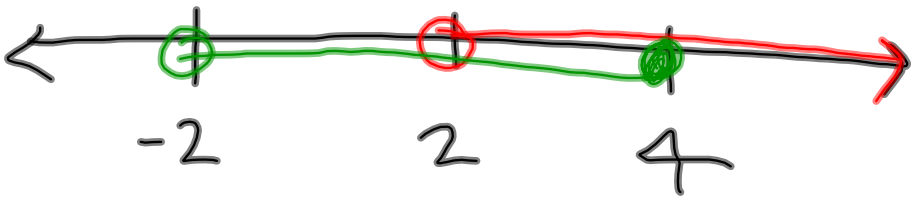
75. $\{x|x\leq 2\}\cap\{x|x\geq 0\}$

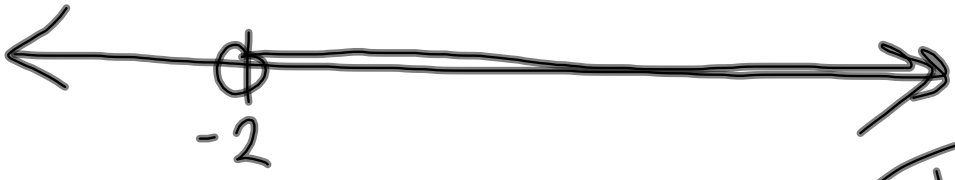


$[0,2]$

$\{x|0\leq x\leq 2\}$

113. $(2,\infty) \cup (-2,4]$





$(-2,\infty)$

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