Lesson 5 : Representing Sets of Numbers cont'd and Solving Inequalities

April 3rd, 2024

$\mathbb{R}$ $\mathbb{N}$ $\mathbb{Z}$ $\mathbb{Q}$ $\mathbb{Q}'$ → main types of number sets

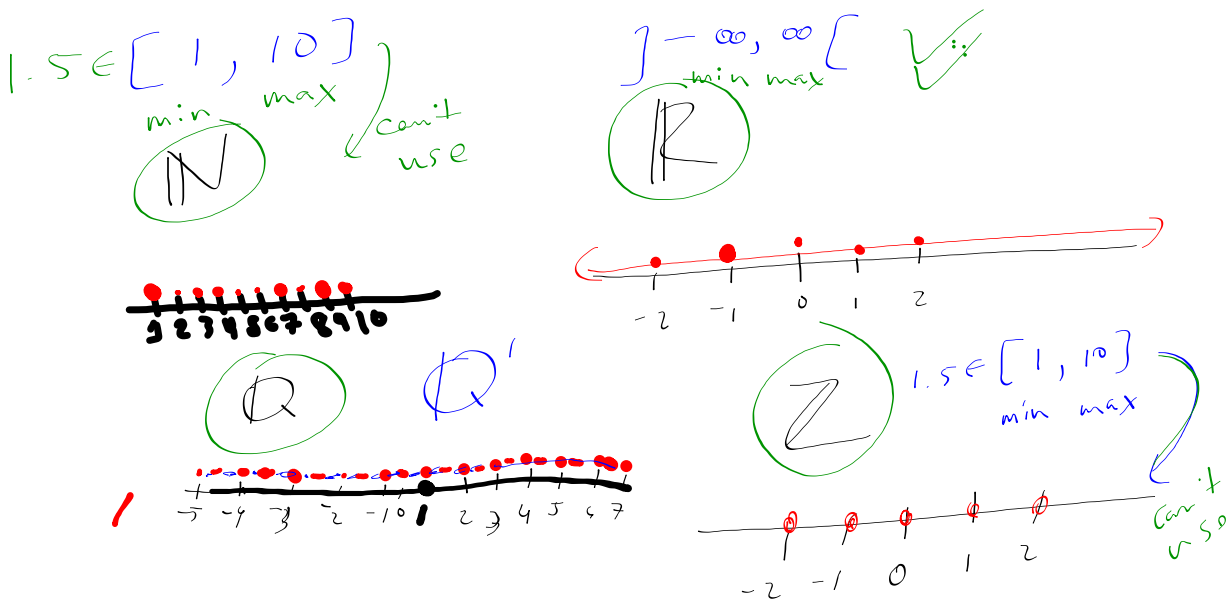
i. Find the definition of your given number set. (group)

ii. Pick (3) examples of elements (numbers) that belong to your set:

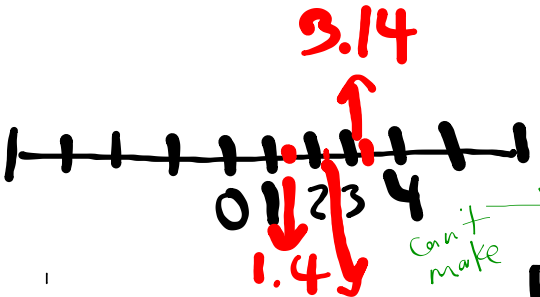
$\{0, \sqrt{2}, -2, -7, 1, \frac{1}{3}, \pi, \frac{10}{2}, e, 33\}$ (3.14... 2.17...)

iii. Represent your number set graphically on the # line

iv. BONUS : YES or NO : could you represent your number set w/ interval notation?


1.5 ∈ [1, 10]
min
max
can't use
ℕ
]−∞, ∞[
min max
ℝ
ℚ
ℚ'
ℤ
1.5 ∈ [1, 10]
min max
can't use

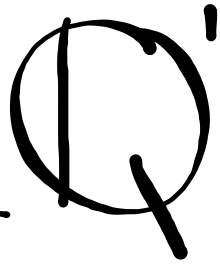
Irrational Numbers:



can't make a fraction

$\pi = 3.14567\ldots$

$0.\overline{33} = \frac{1}{3}$



EX: $\sqrt{2}, \pi, e$

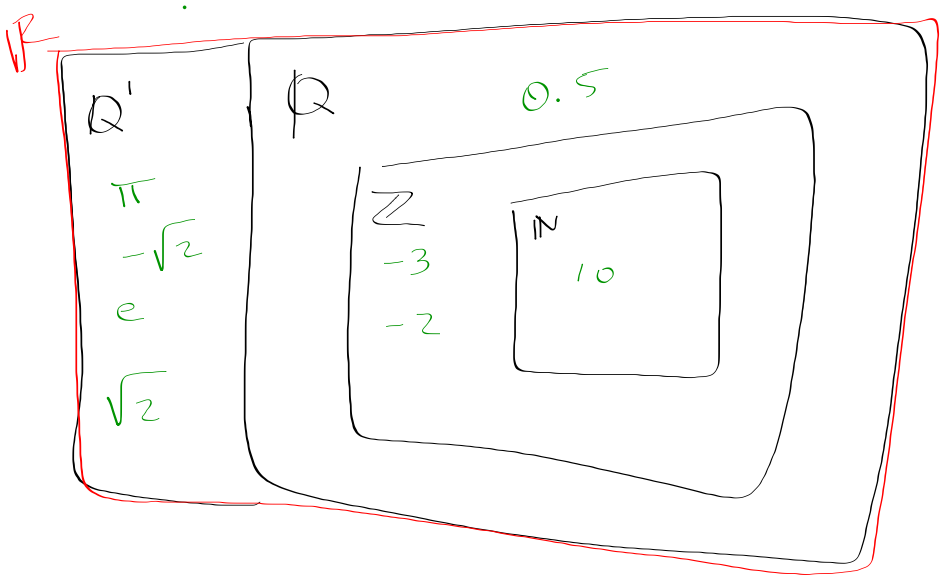
1.4 3.14 2.17

irrational # → 0.31456

INTEGERS ~~no decimal~~

Whole numbers EX: $-2, -1, 0, 1, 2, 3\ldots$

$\mathbb{Z}$


Q'
π
$-\sqrt{2}$
e
$\sqrt{2}$
Q
0.5
Z
-3
-2
N
10

2 last ways to represent sets of number (in addition to (i) interval notation)

{ }

(iv.) Roster Method (listing)

e.x.

$A = \{2, 3\}$

2 elements in set A

$B = \{-1, 0, 1\}$

3 elements in B

not the same

$[-1, 1]$

cuz there's an infinite # of elements

$C = \{1, 2, 3, \dots\}$ to ∞

$\neq$ not same $[1, \infty[$ C

(v.) Set-Builder Notation

e.x.

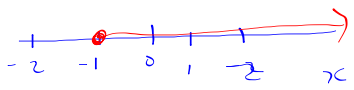
$A = \{x \in \mathbb{N} \mid 2 \leq x \leq 3\}$

$B = \{x \in \mathbb{Z} \mid -1 \leq x \leq 1\}$

$x \in [min, max]$

e.x. $x \in [2, 3]$

(ii). number line



(iii). inequalities (algebraic exp.)

$min \leq x \leq max$

p 179

$\mathbb{N}$

$C = \{x \in \mathbb{N} \mid x \geq 1\}$

C is a set of x elements that belong to the natural #'s such that

$D = \{\dots, 2, 3, 4\}$ to $-\infty$

$\neq$ not the same

$E:]-\infty, 4]$

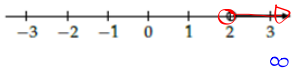
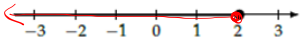
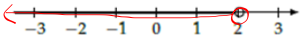
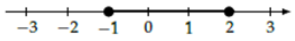
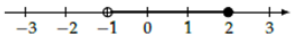
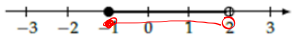
$D = \{x \in \mathbb{Z} \mid x \leq 4\}$

$E = \{x \in \mathbb{R} \mid x \leq 4\}$

Does $3.5 \in E$?

Summary: Representing an Inequality

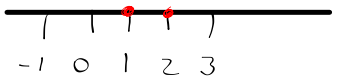
min ≤ x ≤ max [min, max] Roster method Set-Builder Notation

	Algebraic Expression	Number Line (Graphical Representation)	Interval notation
i.	$x > 2$		$x \in]2, +\infty[$
ii	$x \leq 2$		$x \in]-\infty, 2]$
iii	$x < 2$		$x \in]-\infty, 2[$
iv	$-1 \leq x \leq 2$		$x \in [-1, 2]$
v.	$-1 < x \leq 2$		$x \in]-1, 2]$
vii	$-1 \leq x < 2$		$x \in [-1, 2[$

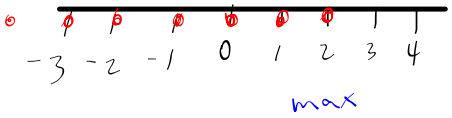
$\{x \in \mathbb{R} \mid 2 < x < \infty\}$

$\{x \in \mathbb{R} \mid x > 2\}$

$\{x \in \mathbb{R} \mid x \leq 2\}$

vii 

$\{1, 2\}$ $\{x \in \mathbb{N} \mid 1 \leq x \leq 2\}$

viii 

min max

$\{\ldots, -1, 0, 1, 2\}$

$\{x \in \_ \mid \text{min} \leq x \leq \text{max}\}$

$\{x \in \mathbb{Z} \mid -\infty < x \leq 2\}$

Fill out the chart

You do #8 and #6 vi, viii

You do:

p. 185 #4.8 (the 1st five rows)

Solving Inequalities : Same as Solving Equations w/ one

- Exception
- difference

Recall:

$4 + 2 = 3 + 3$ (+1, +1) True!

$\frac{4+3}{2} = \frac{3+4}{2}$ True!

$-1 \times 3.5 = 3.5$ ($\times -1$) True!

$-3.5 = -3.5$ True!

Consider:

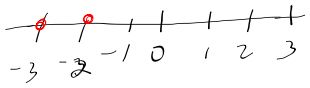
$3 \leq 5$ True

$3 + 1 \leq 5 + 1$ True

$\frac{4}{2} \leq \frac{6}{2}$ True

$-1 \times \quad 2 \leq 3 \times -1$ False

$-2 \leq -3$



$-2 \geq -3$

$\frac{-2}{-1} \geq \frac{-3}{-1}$

$2 \leq 3$

nota bene: you must flip the inequality sign when you x or ÷ by negative #

e.x. Represent solution set on the Number Line:

Solve

$-4 - 1 \cdot x < 2 + 4$

$+4$

$\frac{1 \cdot x}{-1} < \frac{6}{-1}$

$x < -6$ X

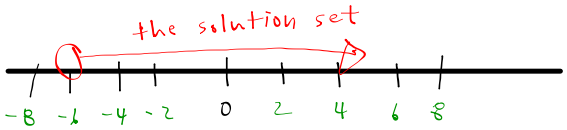
or

$x > -6$ ✓

step i: Isolate x w.o.o. BEDMAS

step ii: Flip sign when needed

step iii: Put answer on # line and check answer



Solution: $\{-4, -2, 0, 2, 2.5\}$

Check by subbing one solution into original inequality:

sub $x = -4$

$-4 - x < 2$

$-4 - (-4) < 2$

$-4 + 4 < 2$

$0 < 2$ True ✓

HmwK:
Read solving 188 - 190
Do p 196 - 197
Pg 198 # 4.15 (1st 3 rows)
Pg 204 #4.22
Pg 166 # 4.1 - 4.2
Pg 185 #4.8 (1st 5 rows)
Pg 186 - 187 #4.9 - 4.11