# MAT1375, Classwork1, Fall2025

ID:_____ Name:_____

*Ch1. Intervals and Functions*

1. Set Notation of a set:

(1) Let V be a set including all the five main vowels in English alphabet. V = $\{a, e, i, o, u\}$

(2) Let O be a set with all the odd positive numbers. O = $\{1, 3, 5, 7, 9, \cdots\}$ or $\{x \mid$ all odd possitive numbers$\}$.

In general, we have $S = \{x \mid$ either list all the elements or give a description$\}$. ("such that")

2. Number systems:

$\mathbb{N} = \{0, 1, 2, 3, \cdots\}$; Natural Number

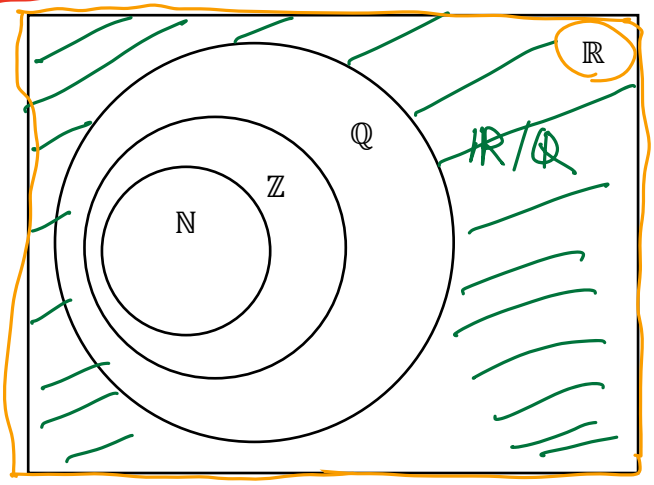
$\mathbb{Z} = \{\cdots, -3, -2, -1, 0, 1, 2, 3, \cdots\}$; Integers

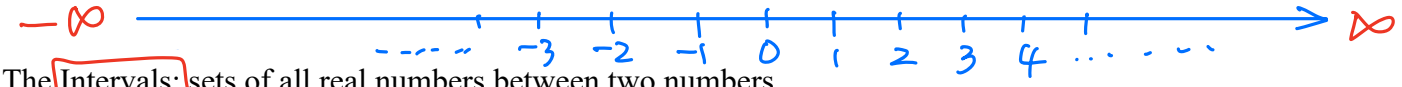
$\mathbb{Q} = \{x = \frac{a}{b} \mid a \in \mathbb{Z}, b \in \mathbb{Z}^+\}$; rational numbers ($a, b$ are integers, $b \neq 0$)

$\mathbb{R}\backslash\mathbb{Q}$: irrational numbers. $\pi$, $\sqrt{2}$, $e$

$\mathbb{R}$ = All real numbers

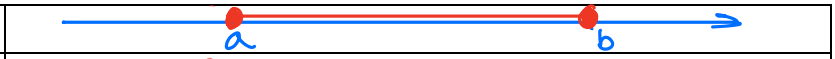
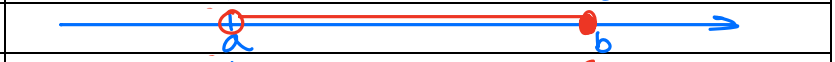
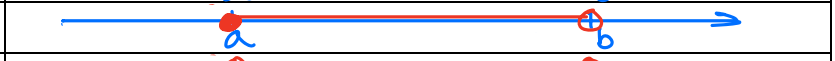
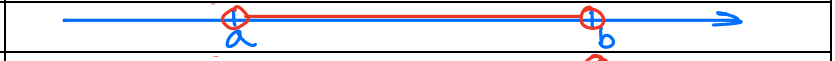
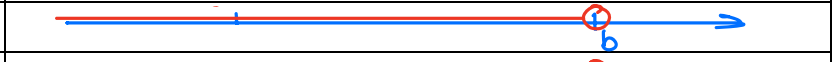
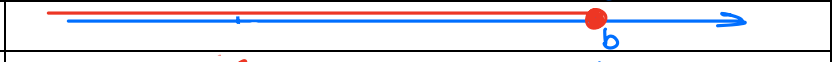
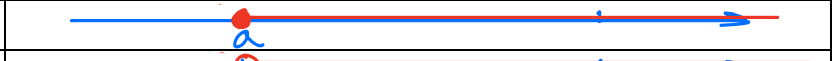
$\mathbb{C} = \{x = a + ib \mid a \in \mathbb{R}, b \in \mathbb{R}\}$; Complex numbers.



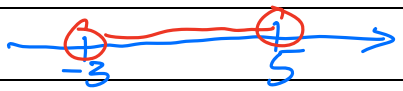
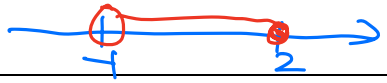
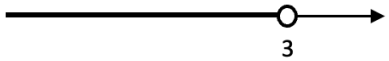

3. The Intervals: sets of all real numbers between two numbers

Let $a$ and $b$ be real numbers with $a \leq b$. We have $[-\infty, b]$: $-\infty$ is NOT included!

| | |
|---|---|
| $[a, b] = \{x \mid a \leq x \leq b\}$, |  |
| $(a, b] = \{x \mid a < x \leq b\}$, |  |
| $[a, b) = \{x \mid a \leq x < b\}$, |  |
| $(a, b) = \{x \mid a < x < b\}$. |  |
| $(-\infty, b) = \{x \mid -\infty < x < b\}$, |  |
| $(-\infty, b] = \{x \mid -\infty < x \leq b\}$, |  |
| $[a, \infty) = \{x \mid a \leq x < \infty\}$, |  |
| $(a, \infty) = \{x \mid a < x < \infty\}$. |  |

$(-\infty, \infty) = \{x \mid -\infty < x < \infty\}$. All Real Number ($\mathbb{R}$)

4. Complete the table

| Inequality notation | Number line | Interval notation |
|---|---|---|
| $-3 < x < 5$ |  | $(-3, 5)$ |
| $-1 < x \leq 2$ |  | $(-1, 2]$ |
| $-\infty < x < 3$ |  | $(-\infty, 3)$ |

Interval $(2, -3) \Rightarrow x > 2$ and $x < -3 \Rightarrow$ It is an interval with nothing

5. The definition of a Function:

Let $A$ and $B$ be nonempty sets. A function $f$ from $A$ to $B$ is an assignment of exactly one element of $B$ to each element of $A$, denoted by $f: A \to B$ which is read as $f$ maps $A$ to $B$. Then we say that $A$ is the input of $f$ and $B$ is the output of $f$.

6. If $f(a) = b$, we say that $b$ is the image of $a$ and the range of $f$ is the set of all images of elements of $A$.

7. Suppose that each student in 1375 is assigned a letter grade from the set $G = \{A, B, C, D, F\}$. And suppose that grades are $A$ for Adams, $C$ for Chou, $B$ for Goodman, $A$ for Rod, and $F$ for Stevens.

Let $S = \{\text{Adams, Chou, Goodman, Rod, Stevens}\}$ be the set of the students.

(a) Is $f: S \to G$ a function?

(b) What is the domain, range, and codomain of $f$?

(c) Is $g: G \to S$ a function?

(a) Adams → A, Chou → B, Goodman → C, Rod → D, Stevens → F

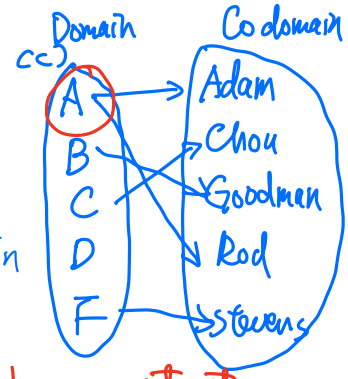
Yes. it's a function

(b) {Adams, Chou, Goodman, Rod, Stevens}

Codomain = {A, B, C, D, F}

range = {A, B, C, D, F}

range is smaller than Codomain



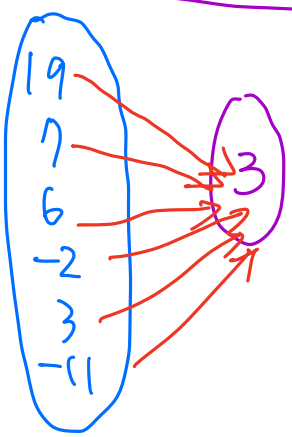

"A" has 2 outputs so g is NOT a function.

8. The tables below describe assignments between inputs $x$ and outputs $y$. Determine which of the given tables describe a function. If they do, determine their domain and range. Describe which outputs are assigned to which inputs.

a)

| x | 19 | 7 | 6 | -2 | 3 | -11 |
|---|---|---|---|---|---|---|
| y | 3 | 3 | 3 | 3 | 3 | 3 |

input / output

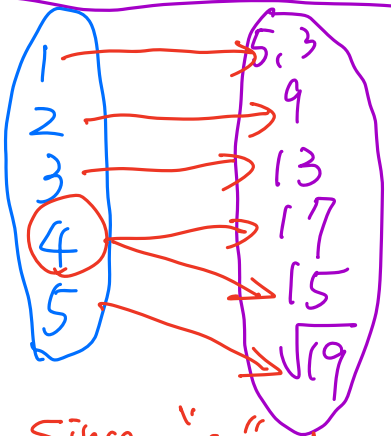



Yes. this is a function

b)

| x | 1 | 2 | 3 | 4 | 4 | 5 |
|---|---|---|---|---|---|---|
| y | 5.3 | 9 | 13 | 17 | 15 | $\sqrt{19}$ |

input / output




Since "4" has 2 outputs thus this is NOT a function