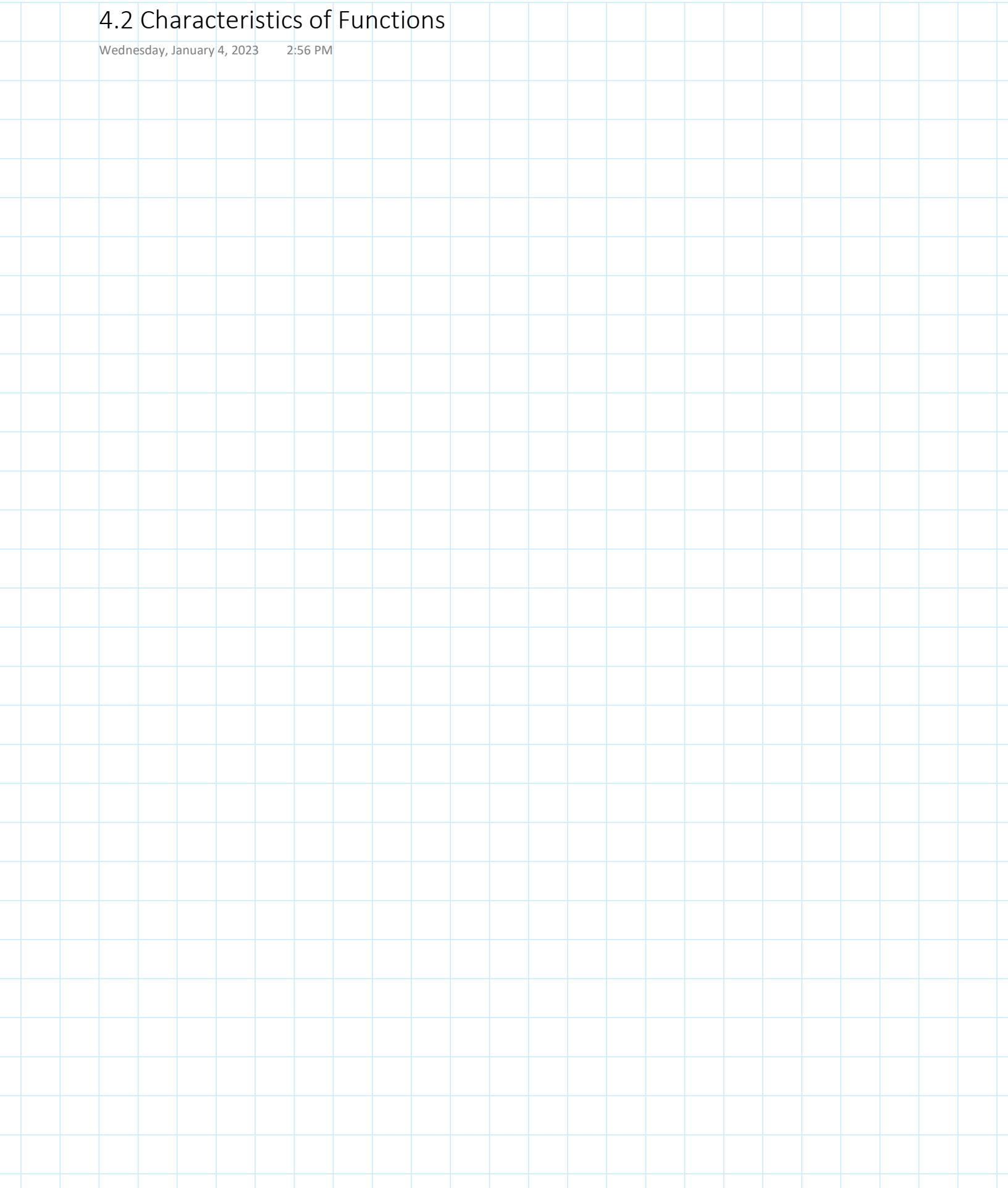


4.2 Characteristics of Functions

Wednesday, January 4, 2023 2:56 PM



4.2 Characteristics of Functions

A. Functions

- A function is a special relation. It is a set of coordinates that, for each value in the domain (x), there is only one value in the range (y).
- All functions are relations but not all relations are functions.

The following relations are functions:

i) table of values

x	y
5	10
6	-15
9	4
14	26

each x -value is used only once

ii) ordered pairs

$\{(-2, -5), (0, 4), (2, 13), (4, 22)\}$

↑ ↑ ↑ ↑

No repeated x -value

The following relations are NOT functions :

i) table of values

x	y
5	10
5	30
6	-15
12	40

$x=5$ has 2 different y -values

ii) ordered pairs

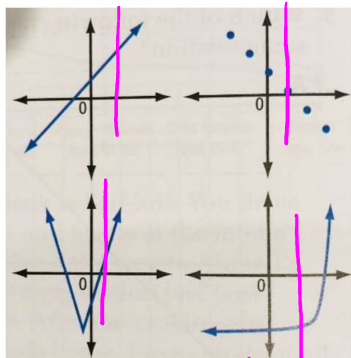
$\{(10, 10), (12, 10), (12, 14), (13, 16)\}$

$x=12$ has 2 different y -values

B. Vertical Line Test

- If each vertical line intersects the graph of a relation at one and only one point, then the relation is a function.

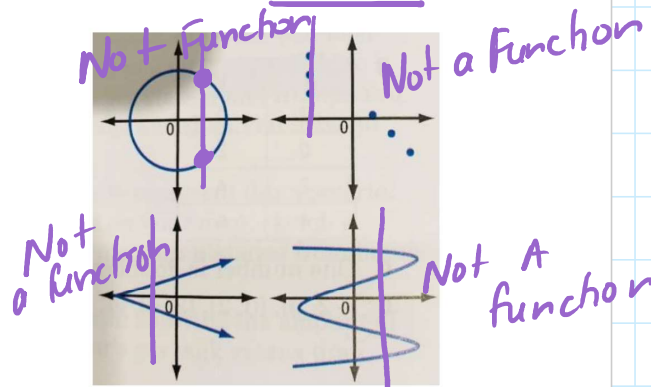
Example : These relations are functions



All Functions

Mrs. Shaw

These relations are not functions



F & PC 10

Example 1 : This table of values shows the number of hours worked, h , and gross salary, S , expressed in dollars.

Hours worked h	Gross Salary in \$
1	12
2	24
3	36
4	48
5	60

a) Why is this relation also a function?

Function. Each h value has only one S -value

b) Identify the independent and dependent variables.

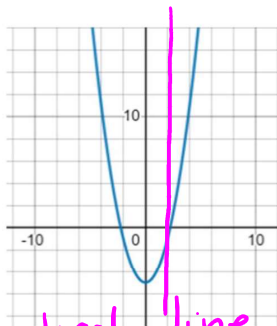
h = independent S = dependent

c) State the domain and range.

domain $\{1, 2, 3, 4, 5\}$ Range = $\{12, 24, 36, 48, 60\}$

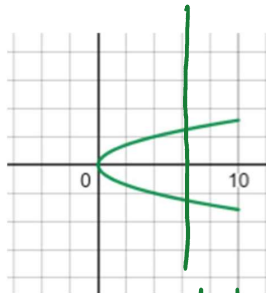
Example 2 : Determine if each relation is a function.

a)



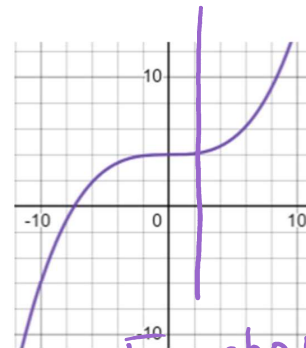
Vertical line hits graph only once
Function

b)



Vertical line hits the graph twice
NOT a function

c)



Function
Vertical line hits graph only once

Example 3 : Determine if the relation is a function.

a) $\{(2, 2), (3, 2), (2, 4)\}$

Not a function
 $x=2$ has 2 y -values

b) $\{(-3, 3), (3, 3), (5, -2), (-5, -2)\}$

Function
each x -value has only one y -value

4.2 Activity

Graph the relations using the website Desmos.com

1) $(-5,8)$

2) $y = 2x + 3$ use a restriction $\{-6 \leq x \leq 3\}$

3) $y = x^2 \{x \geq -3\}$

4) $x^2 + y^2 = 8$

5) $y = x^2 - 7 \{y \leq 7\}$

6) $y = \sqrt{x} \{0 \leq x \leq 10\}$

7) $y^2 = x - 2$

8) $y = 0.01x^3 + 4$

9) $x^3 + y^2 - 6 = 0$

10) $y = \sin x \{-5 \leq x \leq 5\}$

11) $f(x) = -\frac{1}{2}x + 3$