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Relations and Functions



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is a set of ordered pairs.

Relation = $\{ (3,5), (-2,8), (-3,8), (0,-6) \}$

The domain is the set of x values.

The range is the set of y values.



Relation = $\{ (3,5), (-2,8), (-3,8), (0,-6) \}$

Domain: $\{ \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}} \}$

Range: $\{ \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}} \}$



Relation = $\{ (3,5), (-2,8), (-3,8), (0,-6) \}$

Domain: $\{ \underline{-3}, \underline{-2}, \underline{0}, \underline{3} \}$

Range: $\{ \underline{\quad}, \underline{\quad}, \underline{\quad} \}$



Relation = $\{ (3, 5), (-2, 8), (-3, 8), (0, -6) \}$

Domain: $\{ \underline{-3}, \underline{-2}, \underline{0}, \underline{3} \}$

Range: $\{ \underline{-6}, \underline{5}, \underline{8} \}$



can be represented four different ways:

1. table
2. mapping
3. set of ordered pairs
4. graph

What is a Function?

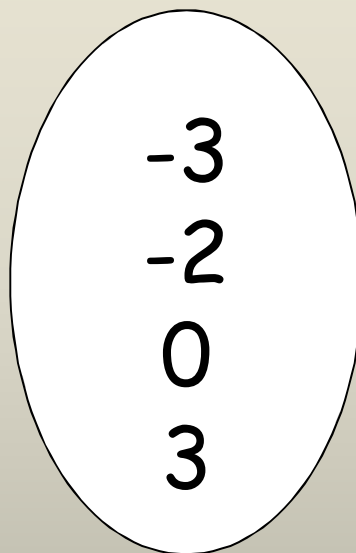
- A relationship where one thing (the inputs) depends upon another (the outputs) is called a function.
 - If it is not a function, it is called a relation.
- In a function each input has exactly one output. More than one input can have the same output.



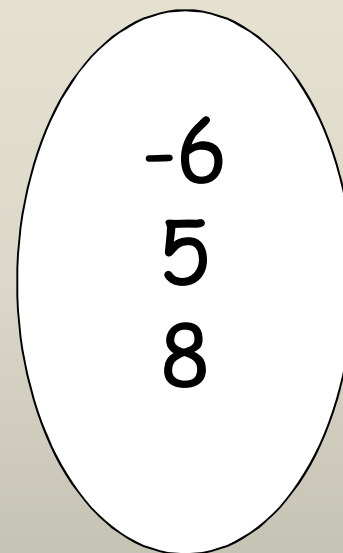
ways to represent a relation:

1. Mapping:

Domain



Range





esent the following relations as a set of ordered pairs.

-2

0

5

6

-3

2

7

$\{ (-2, 2) (0, -3) (5, 7) (6, 7) \}$

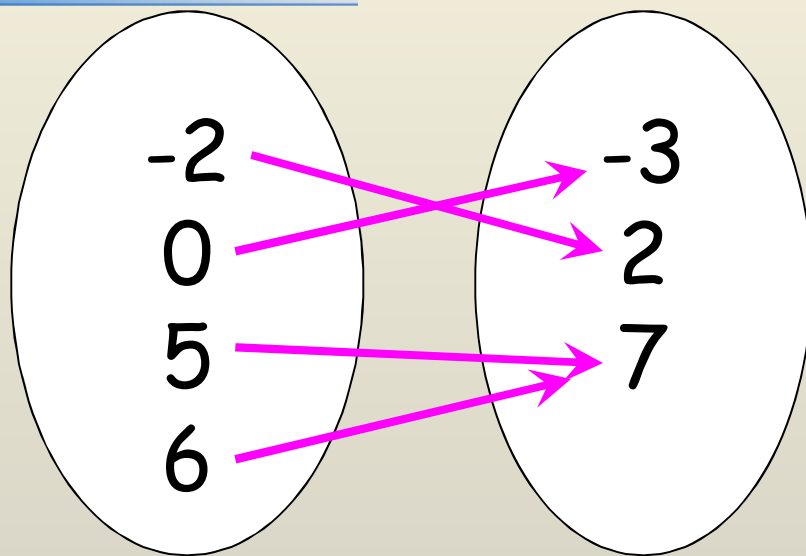


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esent the following relations as a set of ordered pairs.



$\{ (-2, 2) (0, -3) (5, 7) (6, 7) \}$



ways to represent a relation:

2. Table:

domain x	range y
-3	8
-2	8
0	-6
3	5



You Try!

Are the relations below examples of functions? Explain.

1.

Input	Output
1	1
4	3
5	6
10	10

2.

Input	Output
2	3
8	4
10	5
11	6

3.

Input	Output
1	7
2	4
3	13
1	17

4.

Input	Output
5	9
7	8
11	9
7	7

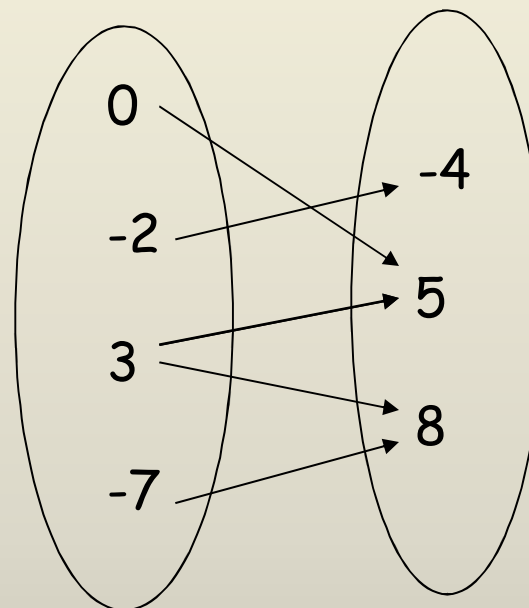
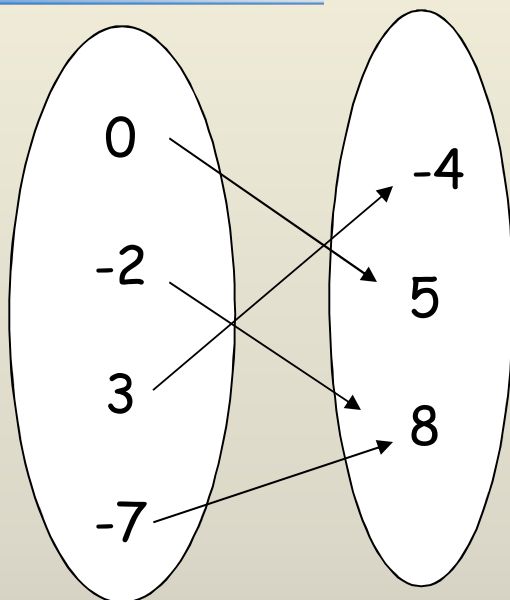


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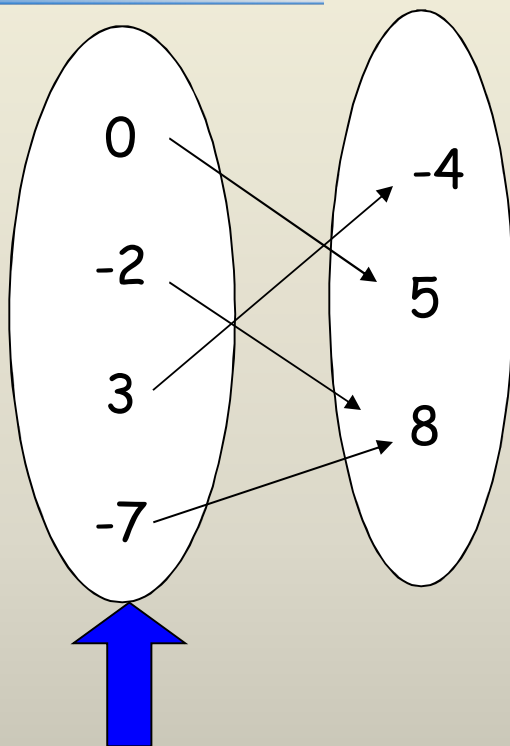
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Which of the following relations are functions? Explain.



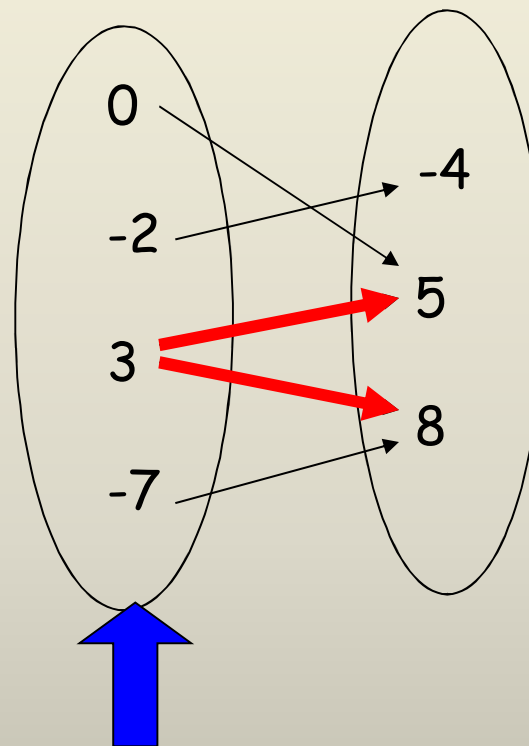


Are the following relations also functions?



Each element of the
domain is only used once.

FUNCTION



3 is used twice.

**NOT A
FUNCTION**



x	y
-4	0
-2	-3
2	3
-4	1

Is this table
displaying a
function?
Explain.



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x	y
-4	0
-2	-3
2	3
-4	1

**NOT A
FUNCTION**

Are all x values used only once?

NO. $x = -4$ is used twice.



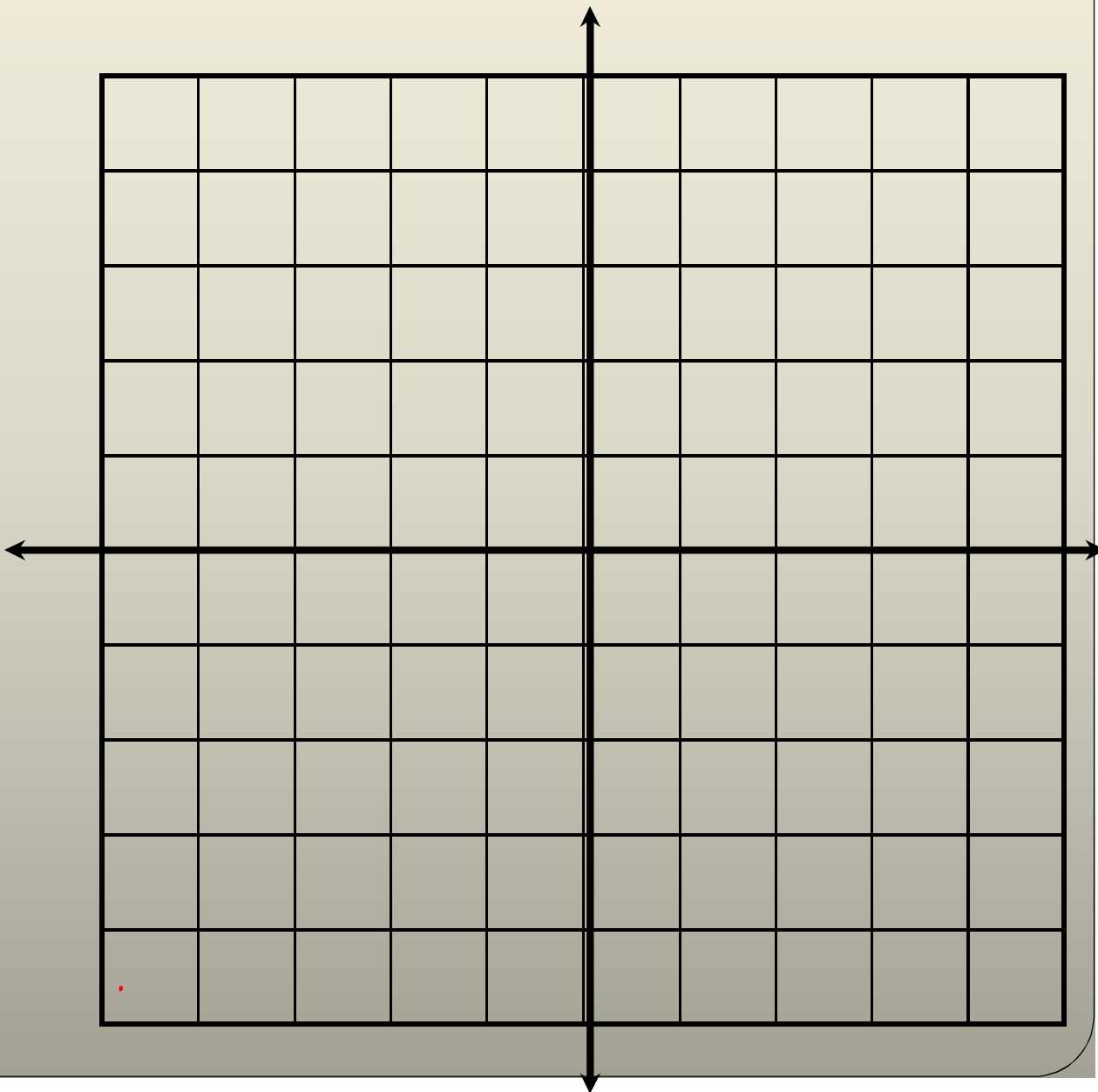
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represent a function:

4. Graph:





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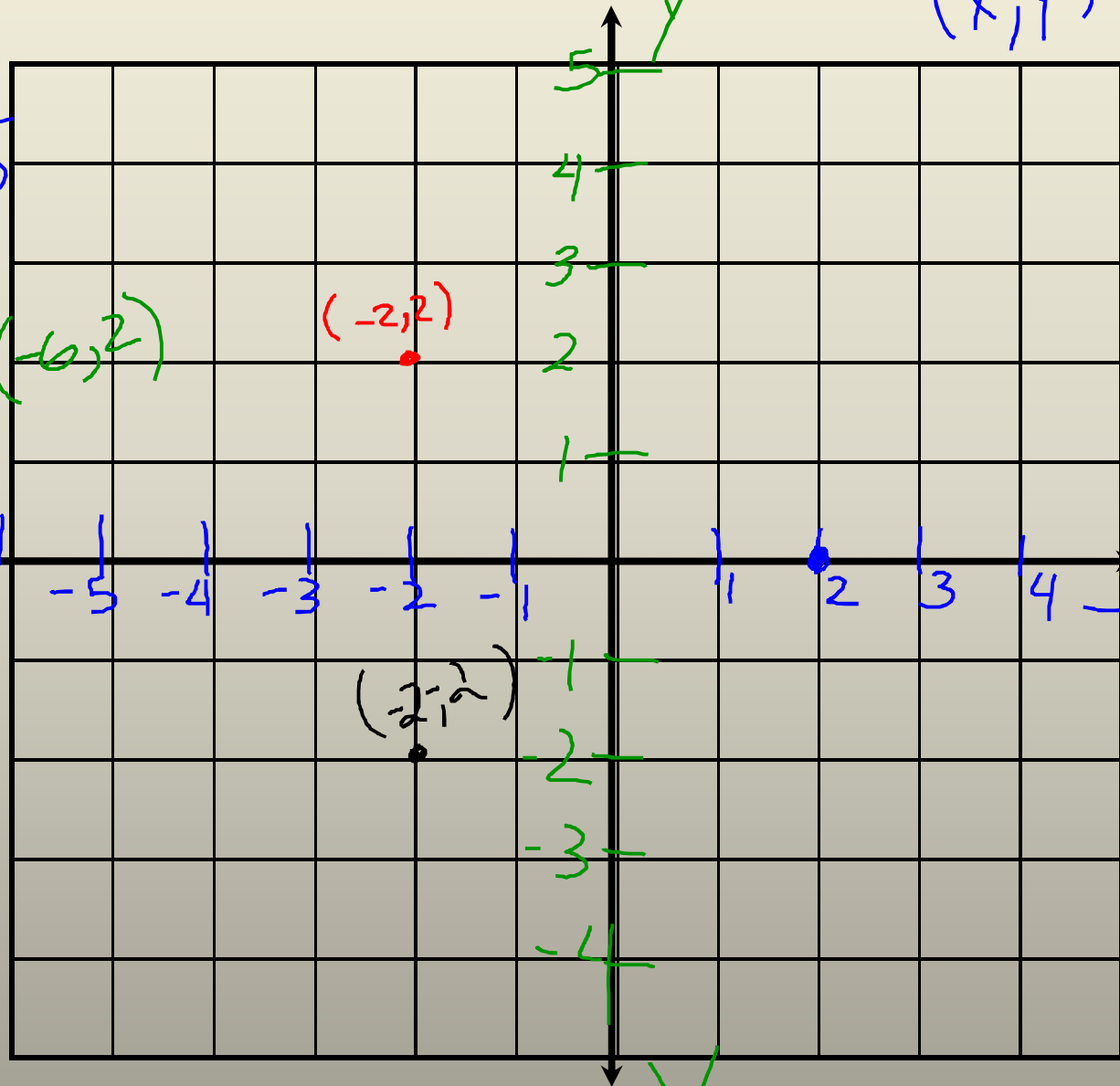
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How to plot ordered pairs

$(2,0)$ $(-2,2)$ $X(-)$
 $(-2,-2)$ $(-6,2)$ $Y(+)$

$X(-)$
 $Y(-)$

III



(x,y)

I
 $X(+)$
 $Y(+)$

$X(+)$
 $Y(-)$
IV



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Plot the following ordered Pairs

-3	0
-1	-2
0	3
2	-7
4	4

$\{ (-3,0) (-1,-2) (0,3) (2,-7) (4,4) \}$

How do we determine if a graph is a function or not?

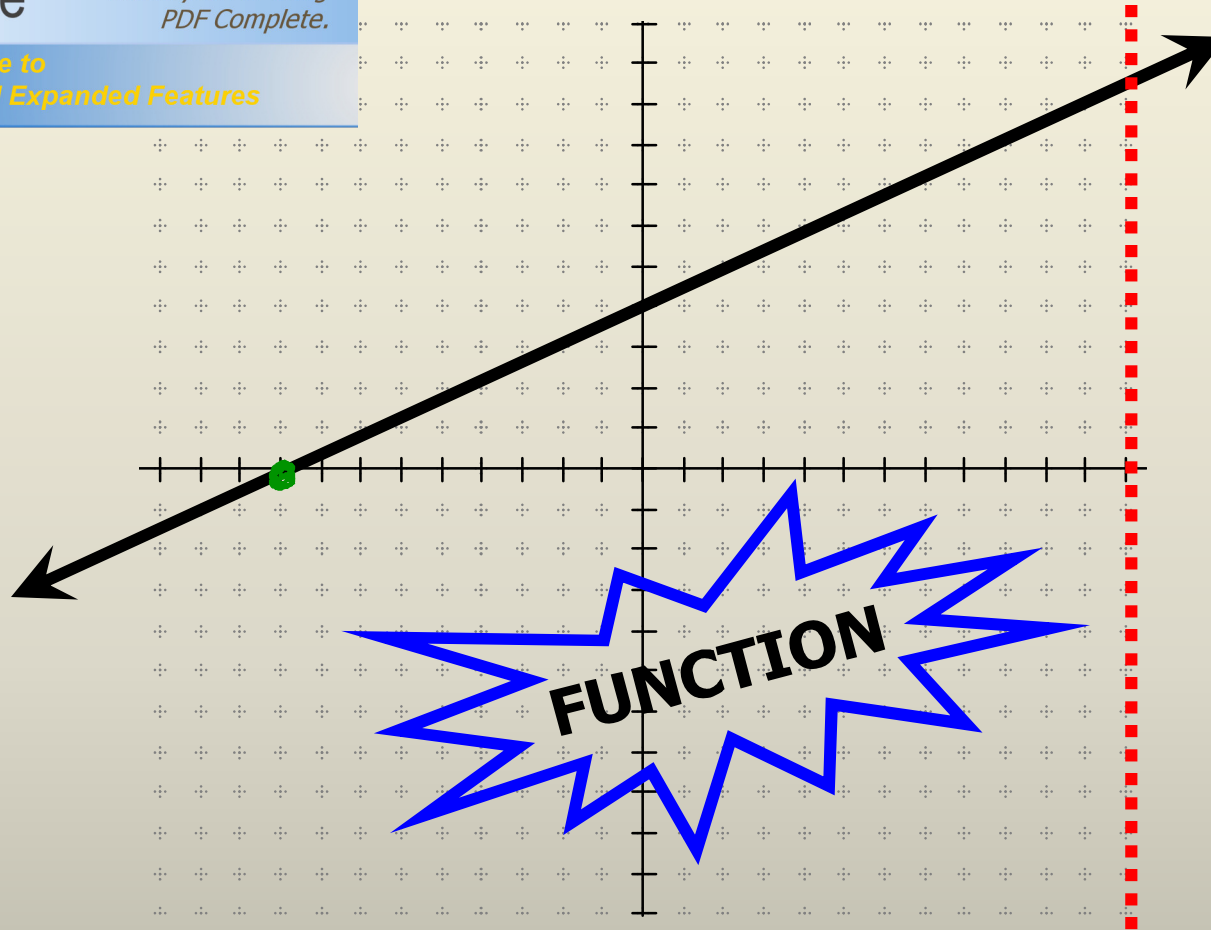
- **Vertical line Test**: you draw a vertical line on the graph to see if the **vertical line** crosses the graph at **only** one point (x-values).



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Will all vertical lines cross the graph
at **only** one point?

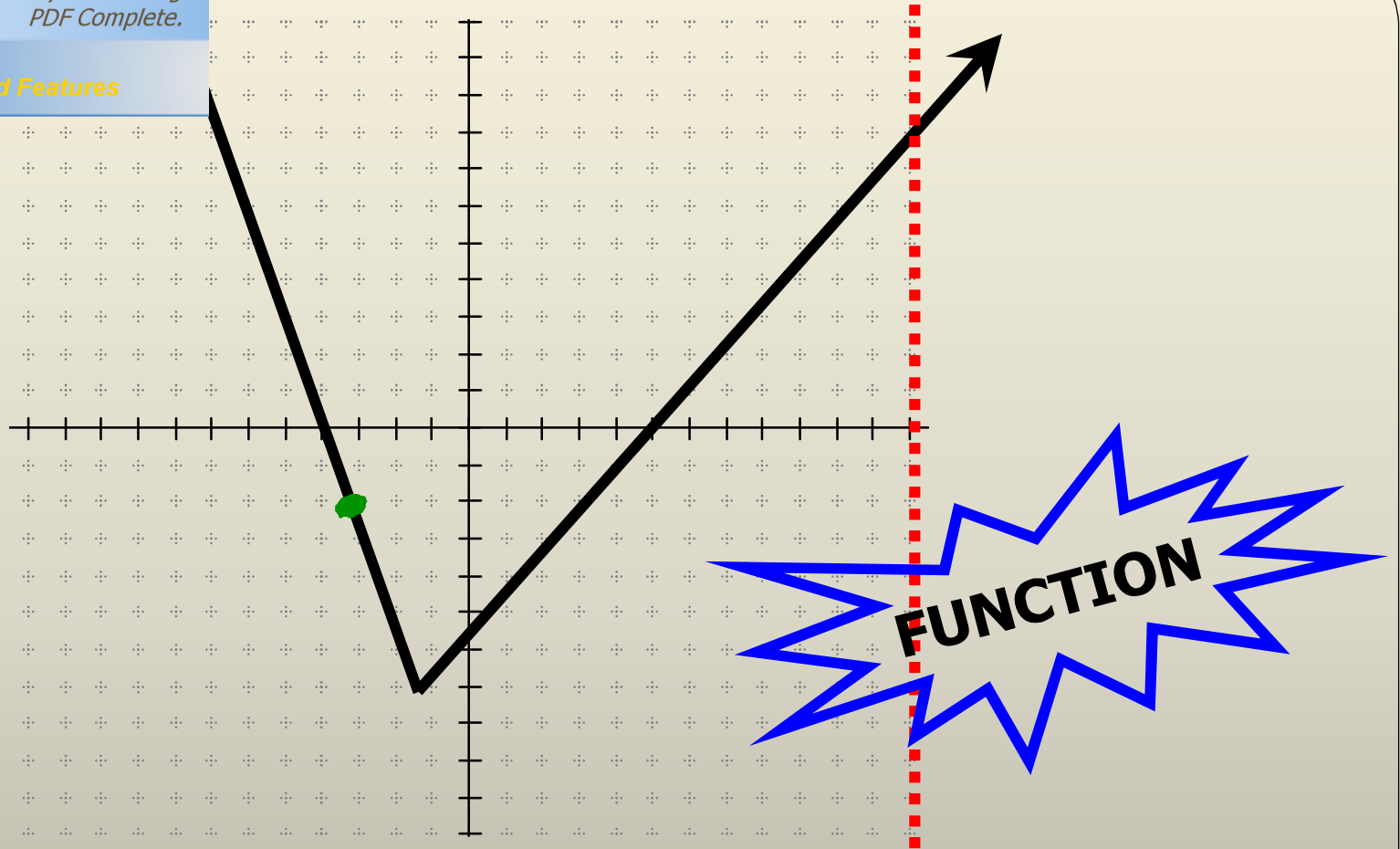
YES. Each x is only used once.



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Will all vertical lines cross the
graph at **only** one point?

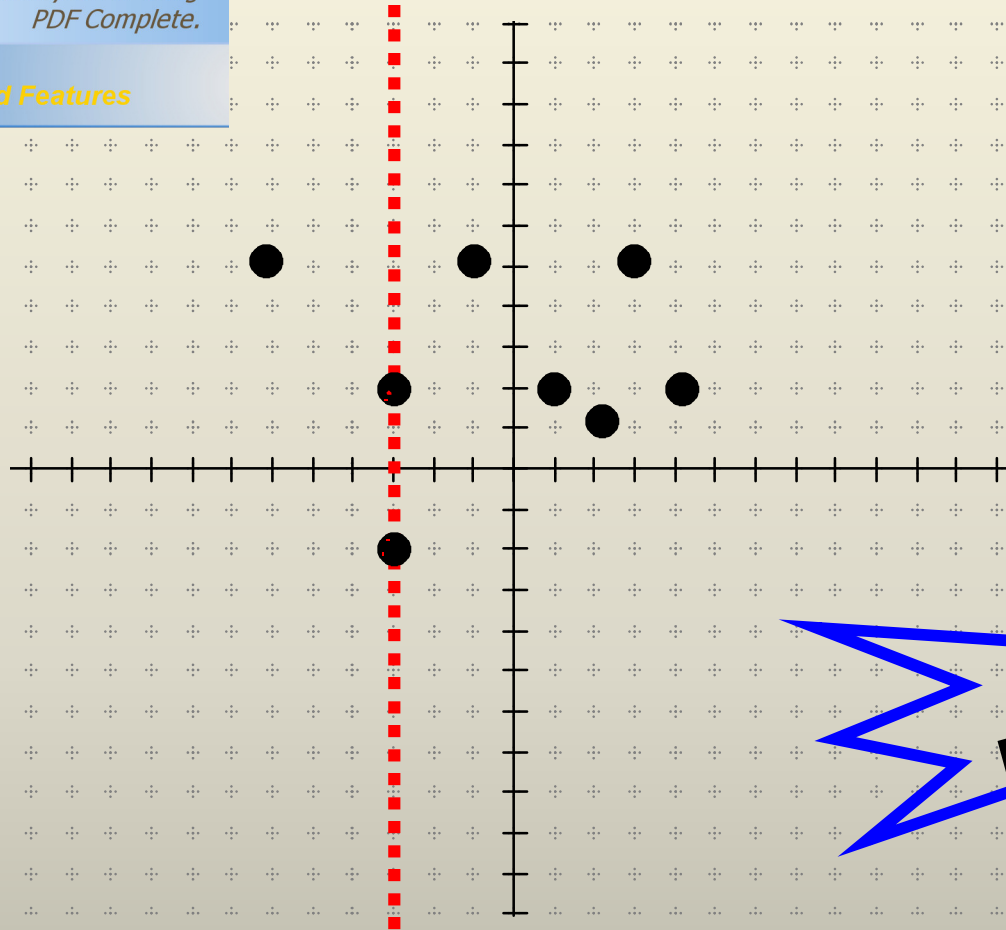
YES. Each x is only used once.



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**NOT A
FUNCTION**

Will all vertical lines cross the
graph at only one point?

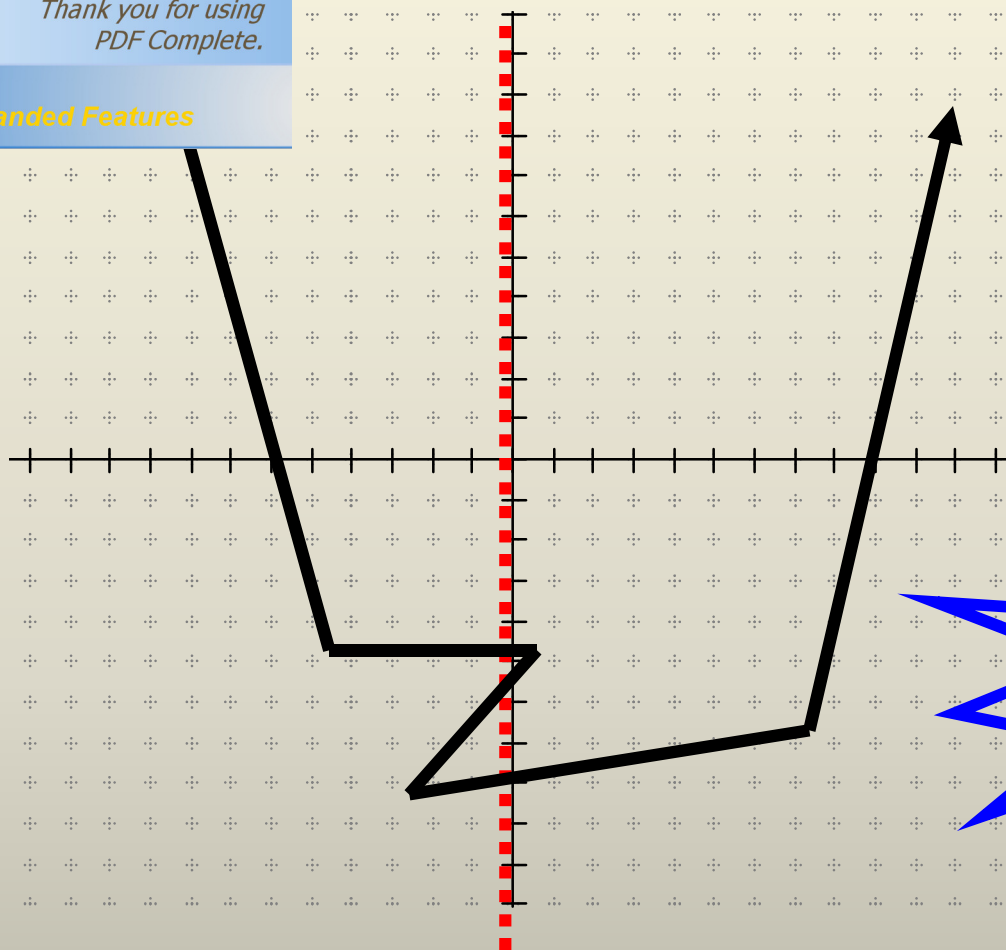
NO. $x = -3$ is used twice.



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**NOT A
FUNCTION**

Will all vertical lines cross the
graph at only one point?

NO. $x = -2$ is used three times.