1.1 Relations and Functions　　Feb 2

Relation - values of the independent variable (x)
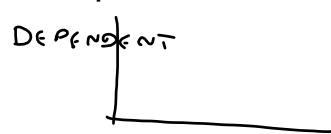
are paired with values of the dependent variable (y)

ex. $\{(1,2),(3,-4)\}$

$y = 2x+1$

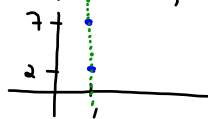Independent variable - does not depend on anything, such as time. (x)

INDEPENDENT

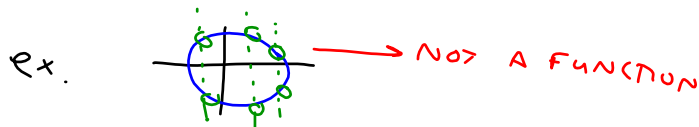Dependent variable - depends on the independent (y)

DEPENDENT

Function - a relation where each input has a unique output.

ex. $\{(1,2),(1,7)\}$ — NOT A FUNCTION

Vertical-line Test - if a vertical line anywhere on the relation passes through more than one point, then it is not a function.

ex. → NOT A FUNCTION

Domain - set of all possible values of the independent variable (x)

ex. $\{(1,2)(5,7)(8,-3)\}$

$D = \{1, 5, 8\}$

Range - set of all possible values of the dependent variable. (y)

$R = \{2, 7, -3\}$ P

ASCENDING

∴ $R = \{-3, 2, 7\}$

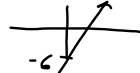For each relation, determine if it also satisfies the properties of a function. State the domain and range of each.

a) $\{(2,3),(3,5),(-1,4),(8,3)\}$

YES, FUNCTION
$D = \{-1, 2, 3, 8\}$
$R = \{3, 4, 5\}$

↑ DON'T REPEAT

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

NOT A FUNCTION
$D = \{-1, 1, 3\}$
$R = \{-2, 2, 3, 4\}$

c) $y = 3x - 6$

-6

YES, FUNCTION
$D = \{x \in \mathbb{R}\}$
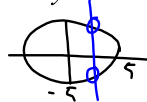$R = \{y \in \mathbb{R}\}$

d) $y = 12$

12

YES, FUNCTION
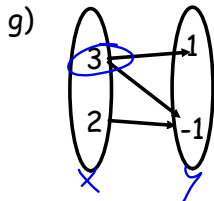$D = \{x \in \mathbb{R}\}$
$R = \{12\}$

e) $y = x^2 + 3$

3

YES, FUNCTION
$D = \{x \in \mathbb{R}\}$
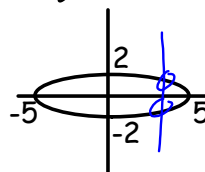$R = \{y \in \mathbb{R} \, / \, y \geq 3\}$

f) $x^2 + y^2 = 25$

-5   5

NOT FUNCTION (VLT)
$D = \{x \in \mathbb{R} \, / -5 \leq x \leq 5\}$
$R = \{y \in \mathbb{R} \, / -5 \leq y \leq 5\}$

g)

3 → -1
2 → -1

MAPPING DIAGRAM

NOT FUNCTION
$D = \{2, 3\}$
$R = \{-1, 1\}$

h)

2
-5   5
-2

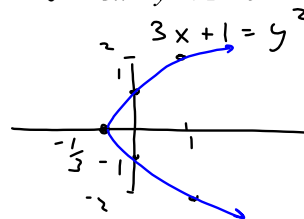ELLIPSE

NOT FUNCTION (VLT)
$D = \{x \in \mathbb{R} \, / -5 \leq x \leq 5\}$
$R = \{y \in \mathbb{R} \, / -2 \leq y \leq 2\}$

i)

SINE WAVE
Sine Wave
10
5
0
-5
-10
Time
8

YES, FUNCTION
$D = \{x \in \mathbb{R} \, / \, 0 \leq x \leq 8\}$
$R = \{y \in \mathbb{R} \, / -5 \leq y \leq 5\}$

j) $3x - y^2 + 1 = 0$

$3x + 1 = y^2$

2
1
-⅓   -1   1
-2

NOT FUNCTION
$D = \{x \in \mathbb{R} \, / \, x \geq -\frac{1}{3}\}$
$R = \{y \in \mathbb{R}\}$

Homework: p10 #1-4,6-9,11

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