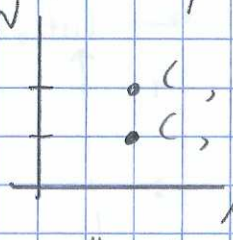
4.1 *Domain and Range*

Warmup: 1. Consider the relation between age, A, and name of PHS student, N, with the set of ordered pairs (A, N). Is this relation a function?

Soln: Hint: If 

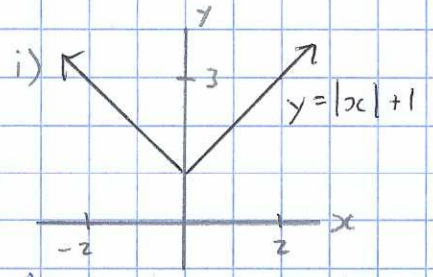
exists, then no.

Our answer is "No." For one age, say 16, you could have more than one name. In my morning class we have (16, Taylor H), and in my afternoon class we have (16, Chloe M).
For a relation to be a function, no two ordered pairs can have the same x coordinate.

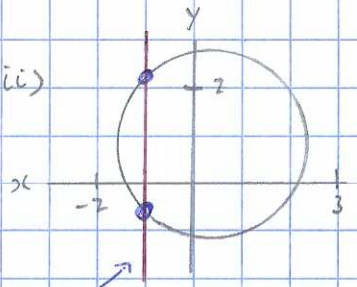
Def'n: Vertical Line Test (V.L.T.).

- If any vertical line drawn through the graph of a relation passes through two or more points, the relation is NOT a function.
- If all vertical lines pass through at most one point, it is a function.

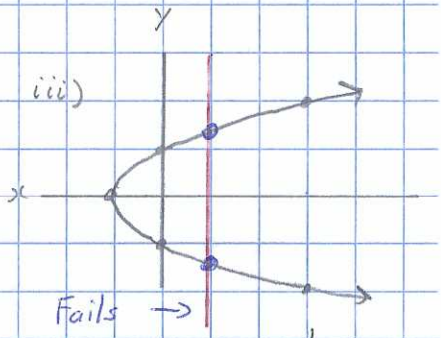
Ex: Are these relations also functions?

i) 

Passes V.L.T. ✓ Function.

ii) 

Relation Fails Here
Fails V.L.T. × Not a Function.

iii) 

Fails →
Fails V.L.T. × Not a Function.

Def'n: Domain: List of first elements in a relation. "List of first names."
Range: List of second elements in a relation. "List of last names."

Ex: List the Domain and Range.

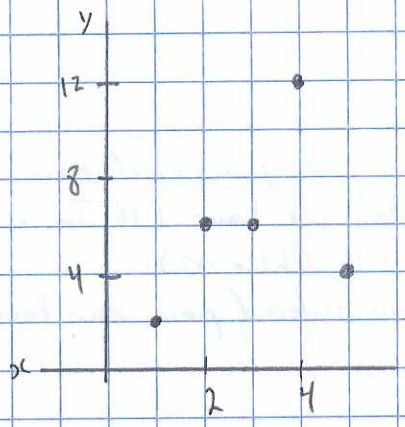
a) Relation K = {(Hafsa, Jama), (Simraj, Kang), (Austin, Keleher)}
Soln: Domain = {Hafsa, Simraj, Austin}
Range = {Jama, Kang, Keleher}

b) Relation L = {(1,1), (2,4), (3,9), (4,16), (5,9)}

Soln, Domain = D = {1, 2, 3, 4, 5} ← List x-values

Range = R = {1, 4, 9, 16} ← List y-values, Convention: Don't repeat the elements. Only write "9" once.

c)

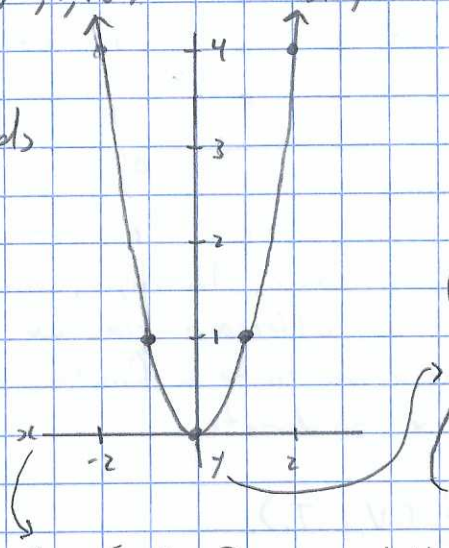


D = {1, 2, 3, 4, 5}

R = {2, 4, 6, 12}

Only Write "6" once

d)



R = {y ≥ 0, y ∈ ℝ}, read as "y is greater than or equal to zero, and y is a member of the real number family."

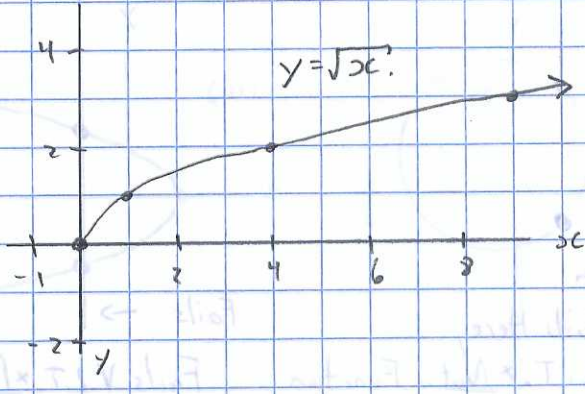
R = {y is above or equals zero, y ∈ ℝ}, some people prefer words.

D = {all x}, or equivalently,

D = {x is an element of real numbers}, or equivalently

D = {x ∈ ℝ}, read as "x is real" and means "x can be any number."

e)



D = {x ∈ ℝ, x ≥ 0} ✓

aka, D = {all x, x can not be negative}

aka, D = {x is any Real number, x ≥ 0}

R = {y ∈ ℝ, y ≥ 0} ✓

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