Representation of Relations

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What is a Relation?

A relation is any set of ordered pairs.

Example 1

Suppose you are working in a fast food company. You earn Php 40 per hour. Your earnings are related to the number of hours of work. Represent this situation using a relation.

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Hours	**Earnings**
1	

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Hours	**Earnings**
1	Php 40

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Hours	**Earnings**
1	Php 40
2	

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Hours	**Earnings**
1	Php 40
2	Php 80

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Hours	**Earnings**
1	Php 40
2	Php 80
3	

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Hours	**Earnings**
1	Php 40
2	Php 80
3	Php 120

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Hours	**Earnings**
1	Php 40
2	Php 80
3	Php 120
4	

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Hours	**Earnings**
1	Php 40
2	Php 80
3	Php 120
4	Php 160

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Hours	**Earnings**
1	Php 40
2	Php 80
3	Php 120
4	Php 160
5	

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Hours	**Earnings**
1	Php 40
2	Php 80
3	Php 120
4	Php 160
5	Php 200

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Hours	**Earnings**
1	Php 40
2	Php 80
3	Php 120
4	Php 160
5	Php 200

Relation $= \{(1, 40), (2, 80), (3, 120), (4, 160), (5, 200)\}$

Example 2

Suppose you want to call your mother by phone. The charge of a pay phone call is Php 5 for the first 3 minutes and an additional charge of Php 2 for every additional minute or a fraction of it. Represent this situation using a relation, then determine its domain and range.

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Minutes	**Charge**

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Minutes	**Charge**
1	

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Minutes	**Charge**
1	Php 5

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Minutes	**Charge**
1	Php 5
2	

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Minutes	**Charge**
1	Php 5
2	Php 5

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Minutes	**Charge**
1	Php 5
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Minutes	**Charge**
1	Php 5
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Minutes	**Charge**
1	Php 5
2	Php 5
3	Php 5
4	

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Minutes	**Charge**
1	Php 5
2	Php 5
3	Php 5
4	Php 7

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Suppose you want to call your mother by phone. The charge of a pay phone call is Php 5 for the first 3 minutes and an additional charge of Php 2 for every additional minute or a fraction of it. Represent this situation using a relation, then determine its domain and range.

Minutes	**Charge**
1	Php 5
2	Php 5
3	Php 5
4	Php 7
5	

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Suppose you want to call your mother by phone. The charge of a pay phone call is Php 5 for the first 3 minutes and an additional charge of Php 2 for every additional minute or a fraction of it. Represent this situation using a relation, then determine its domain and range.

Minutes	**Charge**
1	Php 5
2	Php 5
3	Php 5
4	Php 7
5	Php 9

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Minutes	**Charge**
1	Php 5
2	Php 5
3	Php 5
4	Php 7
5	Php 9
6	

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Minutes	**Charge**
1	Php 5
2	Php 5
3	Php 5
4	Php 7
5	Php 9
6	Php 11

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Minutes	**Charge**
1	Php 5
2	Php 5
3	Php 5
4	Php 7
5	Php 9
6	Php 11

$$\text{Relation} = \{(1,5),(2,5),(3,5),(4,7),(5,9),(6,11)\}$$

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Minutes	**Charge**
1	Php 5
2	Php 5
3	Php 5
4	Php 7
5	Php 9
6	Php 11

$\text{Relation} = \{(1,5),(2,5),(3,5),(4,7),(5,9),(6,11)\}$
$\text{Domain} = \{1,2,3,4,5,6\}$

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Minutes	**Charge**
1	Php 5
2	Php 5
3	Php 5
4	Php 7
5	Php 9
6	Php 11

$\text{Relation} = \{(1,5),(2,5),(3,5),(4,7),(5,9),(6,11)\}$
$\text{Domain} = \{1,2,3,4,5,6\}$
$\text{Range} = \{5,7,9,11\}$

How to Represent Relations?

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1. Ordered Pairs

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3. Mapping Diagram

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4. Graph

How to Represent Relations?

1. Ordered Pairs
2. Table
3. Mapping Diagram
4. Graph
5. Rule

How to Represent Relations Using Tables?

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

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Horizontal

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

Horizontal

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

How to Represent Relations Using Tables?

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

Horizontal

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

Vertical

How to Represent Relations Using Tables?

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

Horizontal

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

Vertical

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

How to Represent Relations Using Mapping Diagrams?

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

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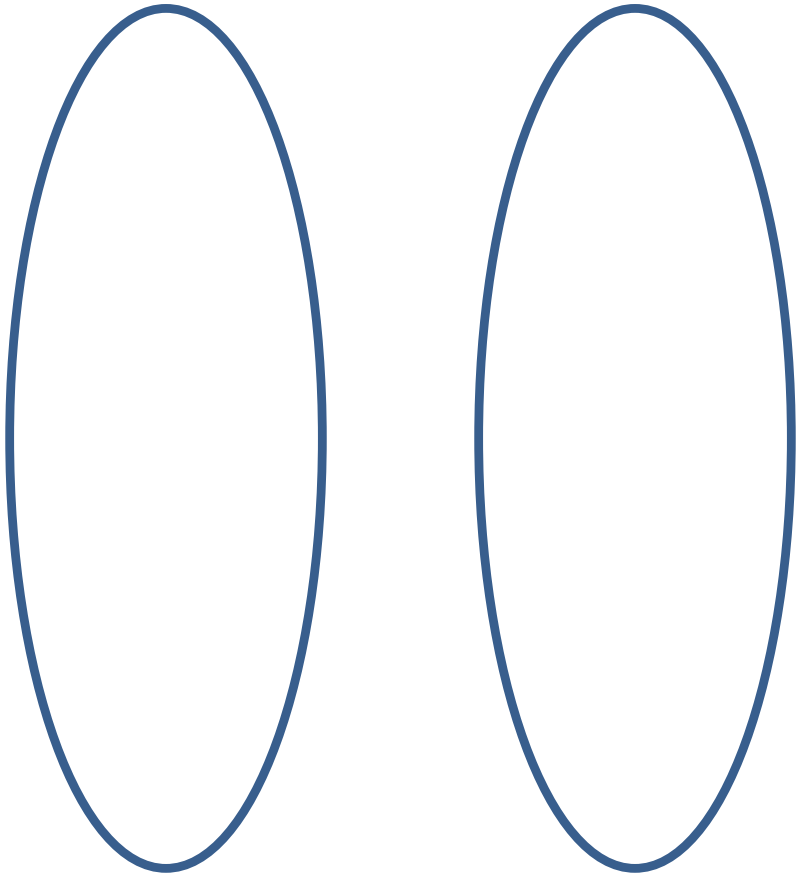

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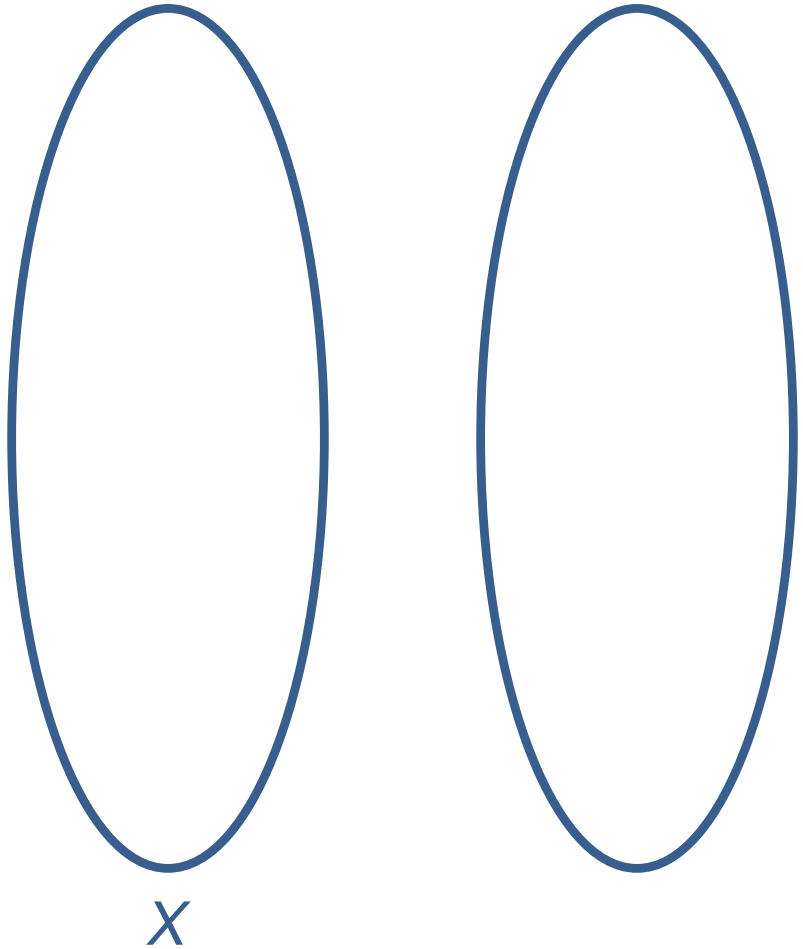

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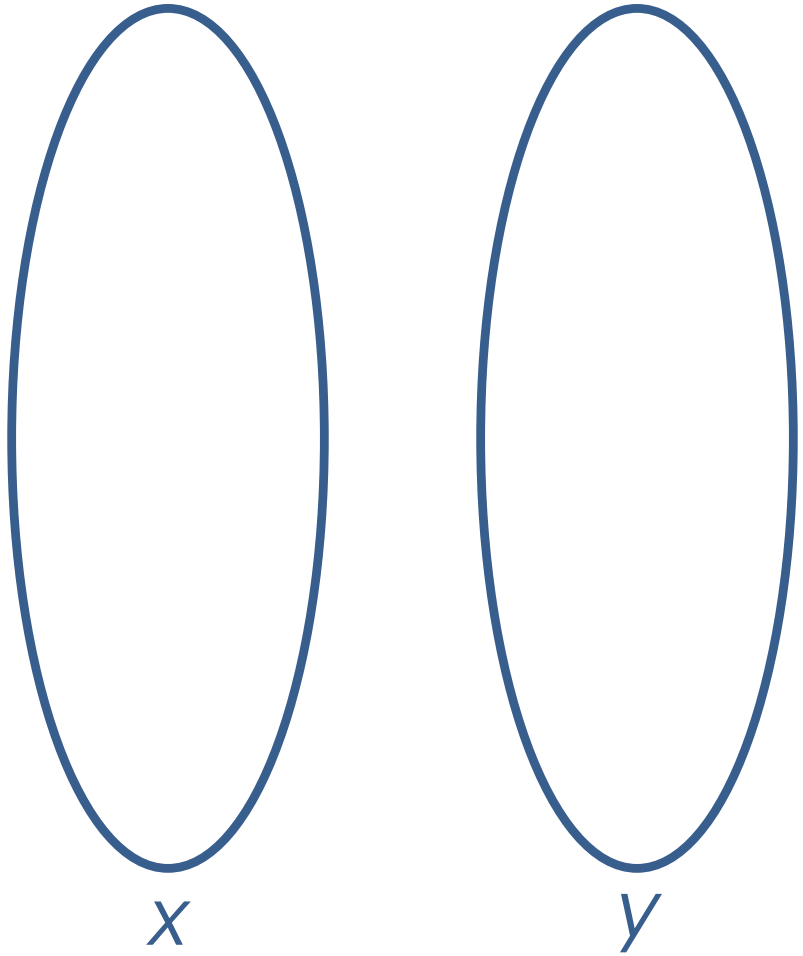

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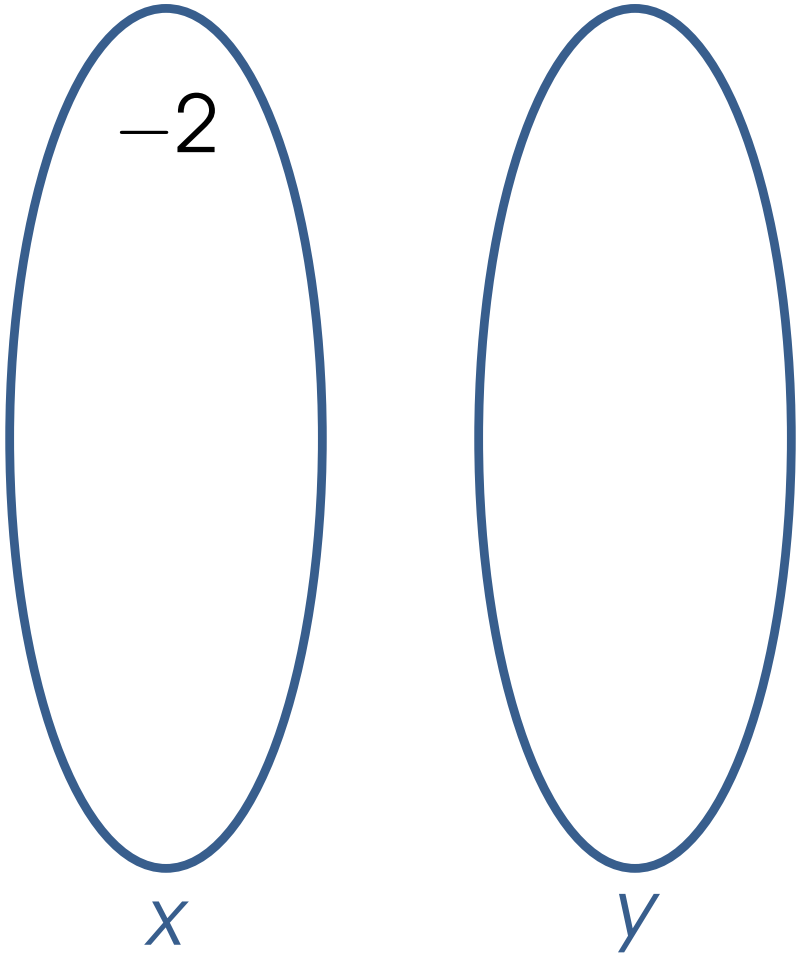

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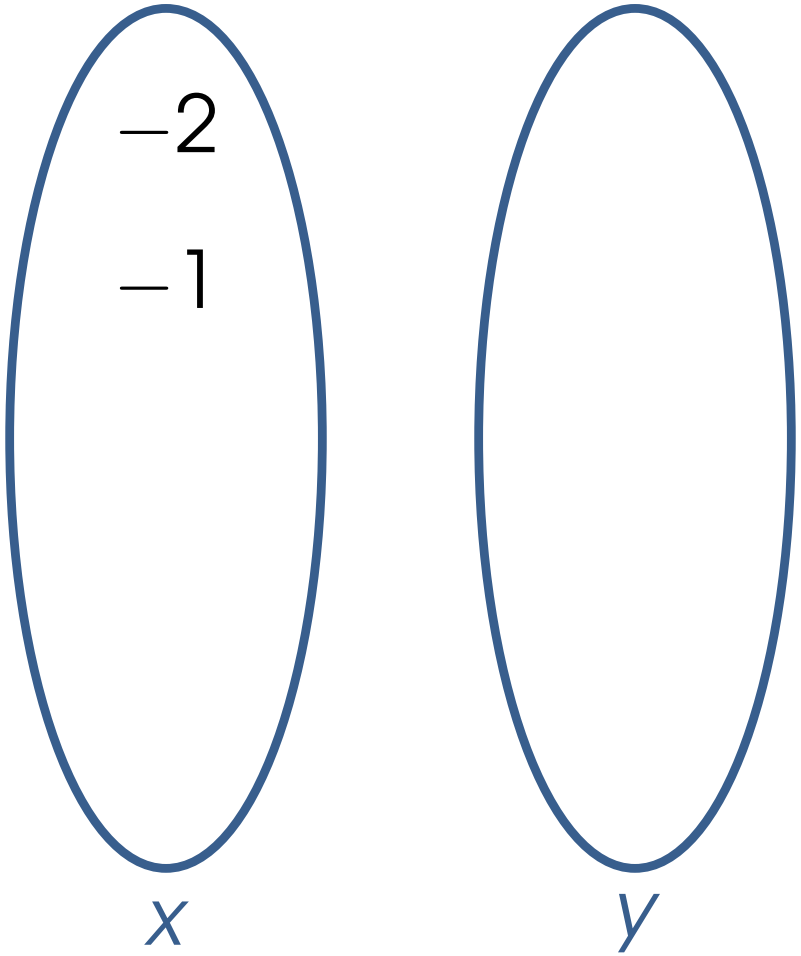

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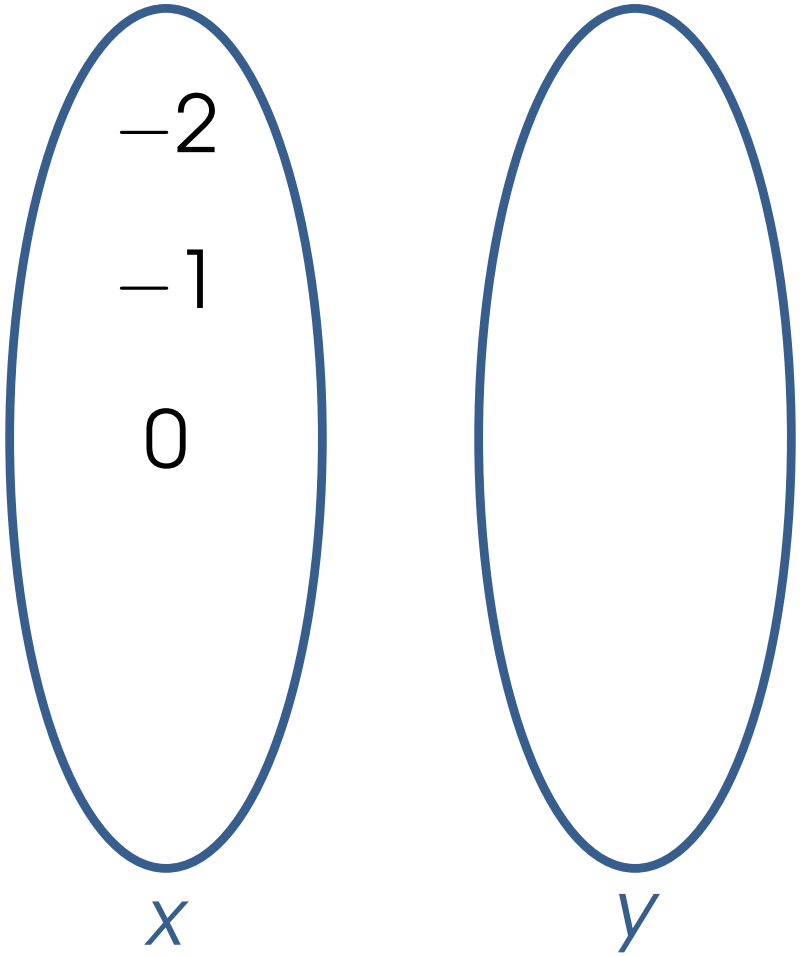

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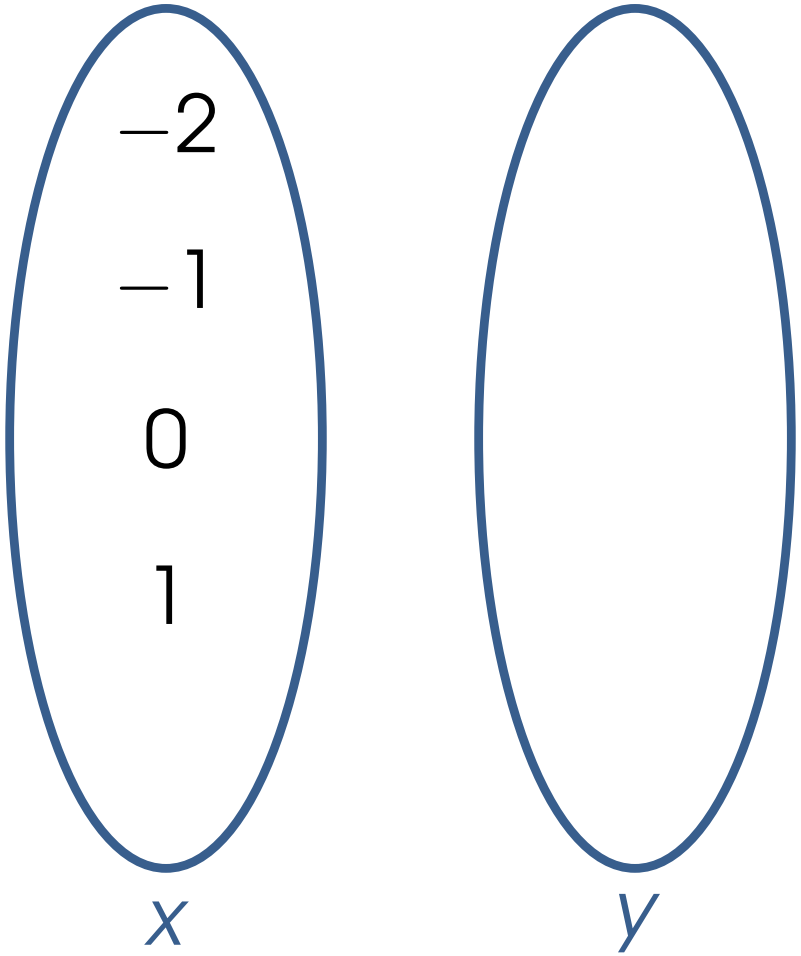

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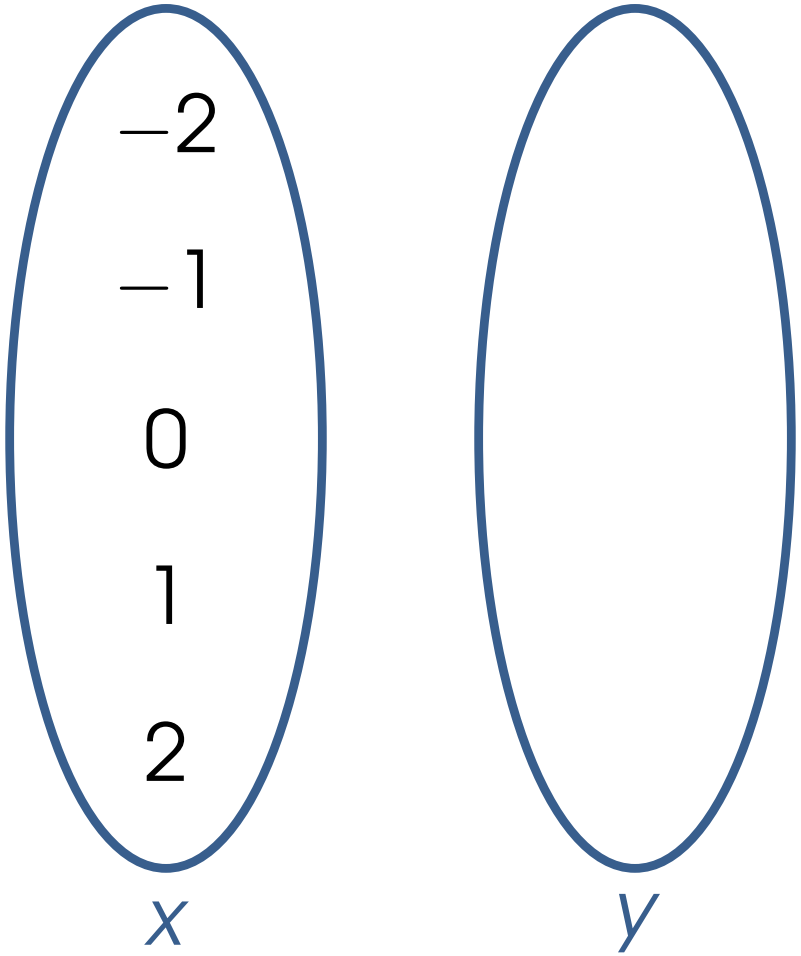

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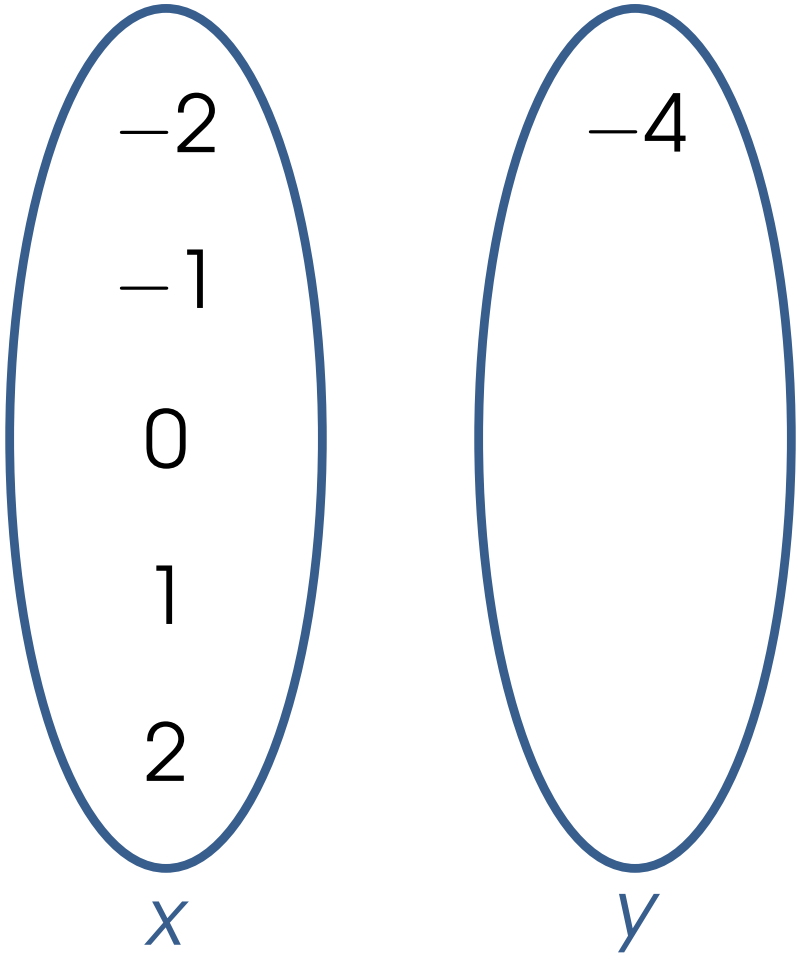

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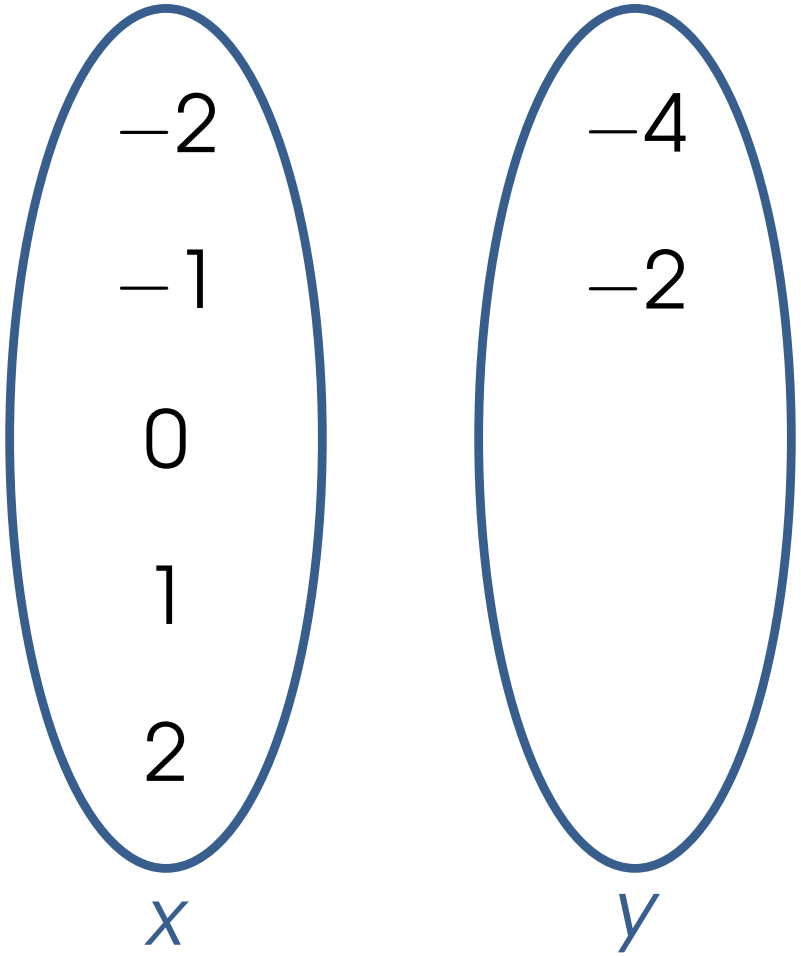

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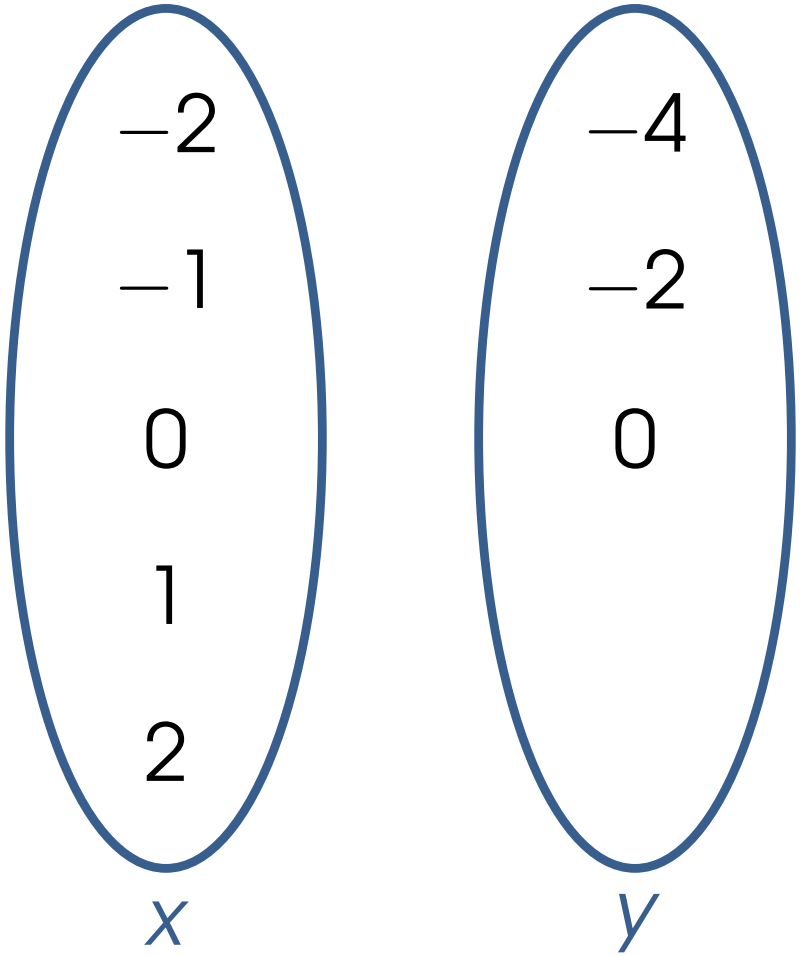

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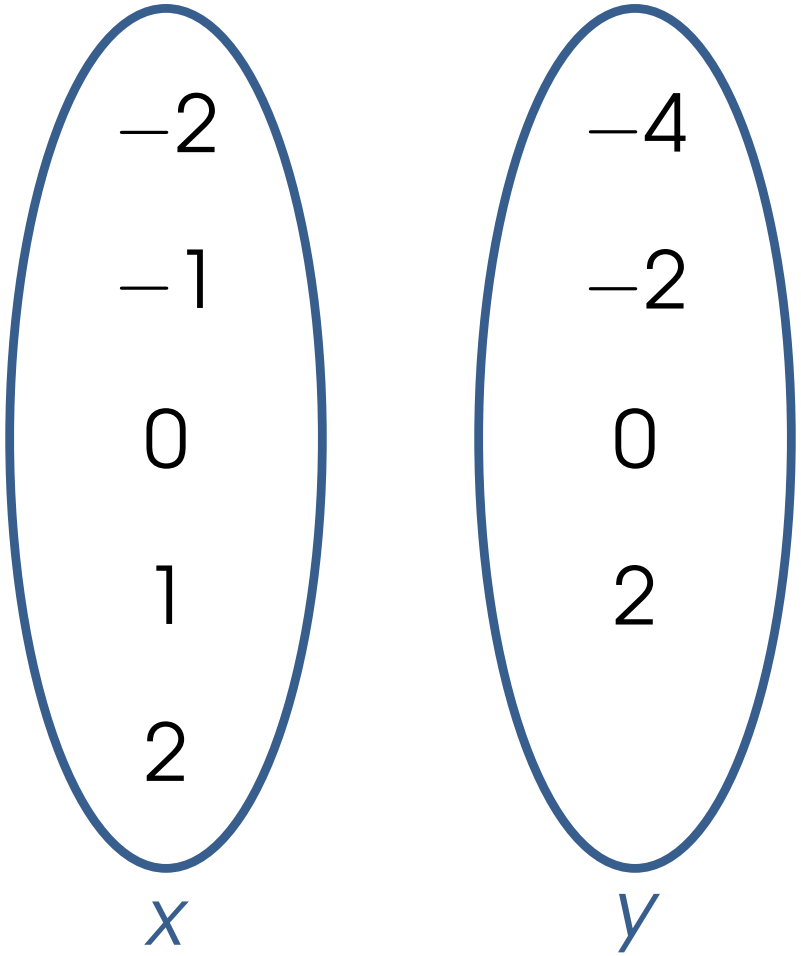

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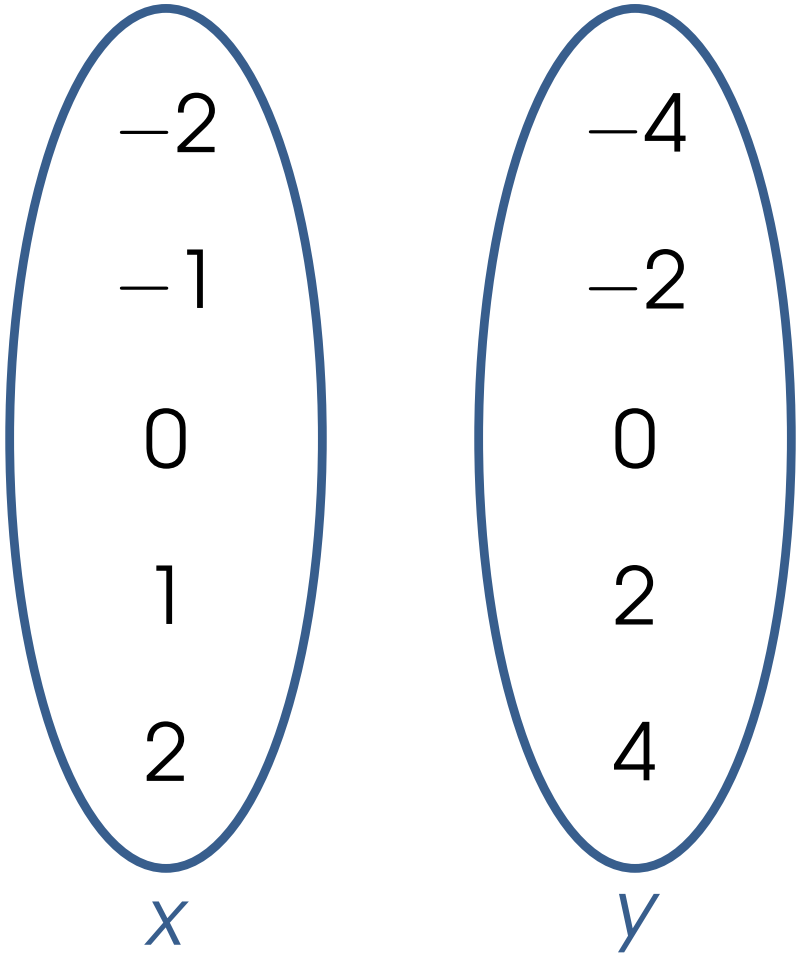

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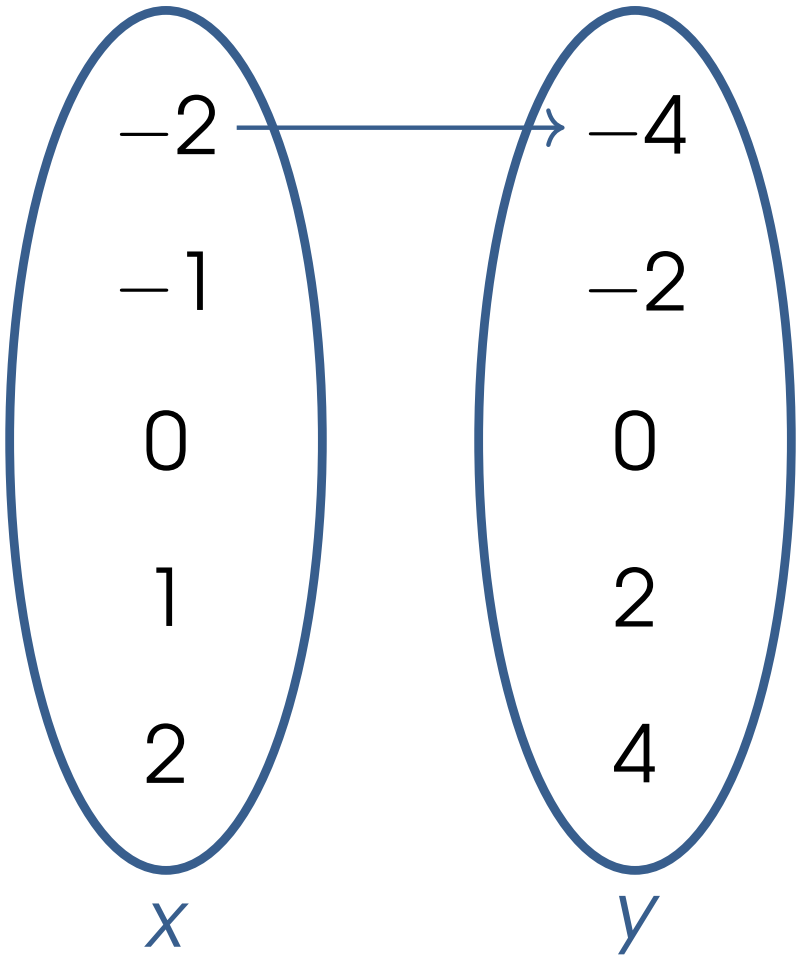

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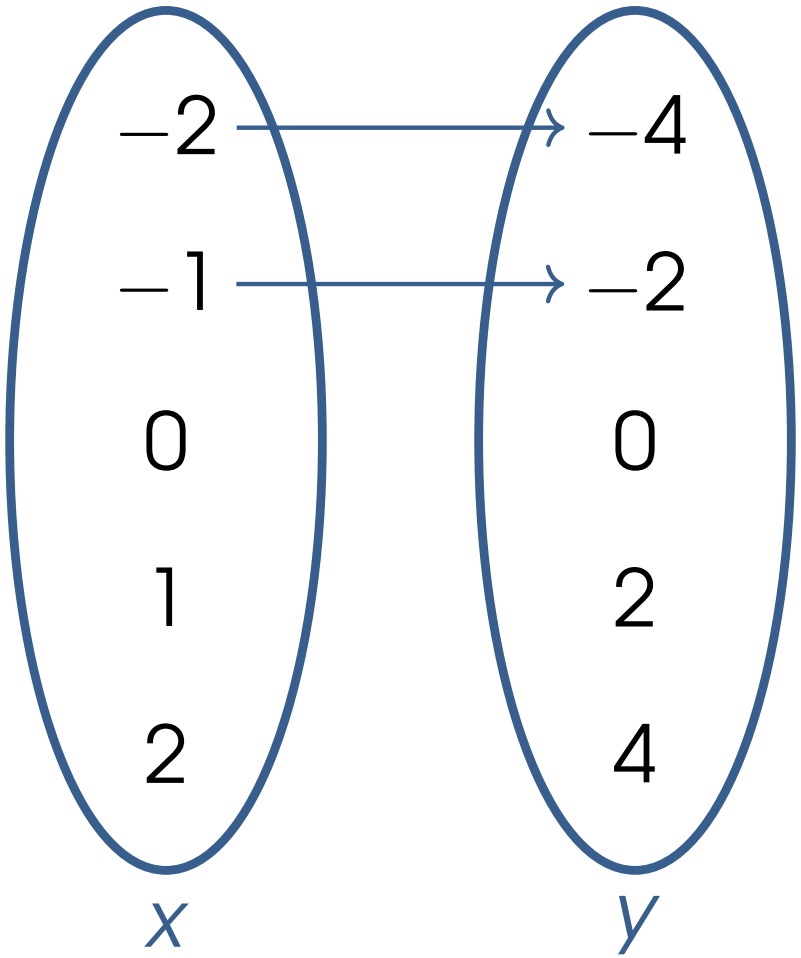

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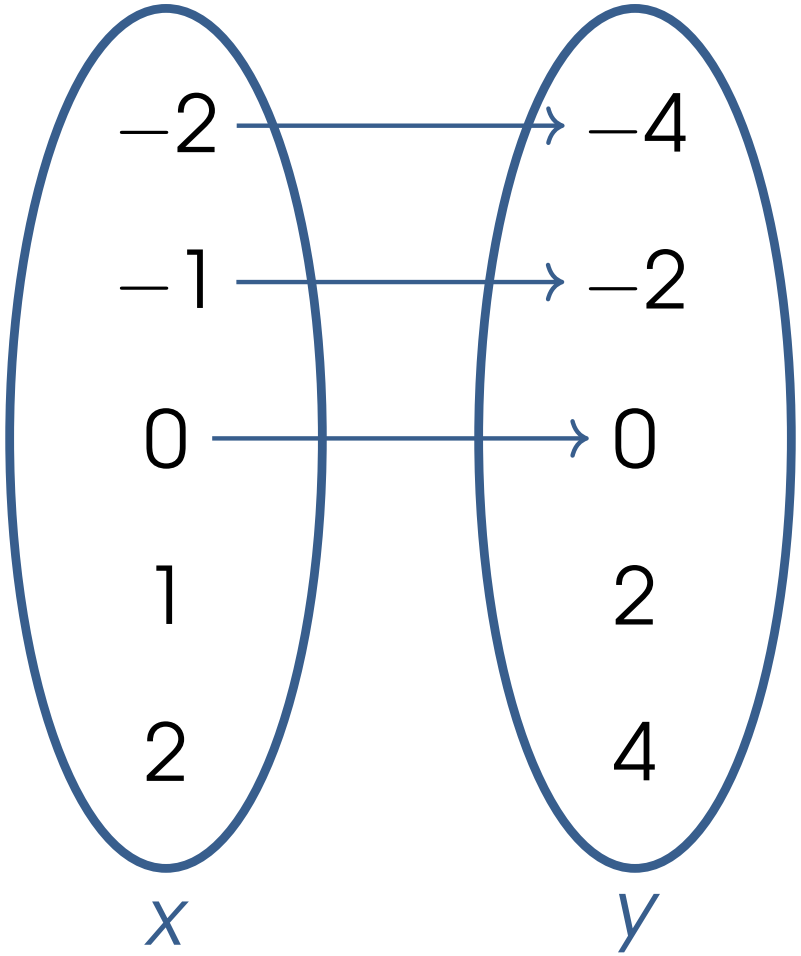

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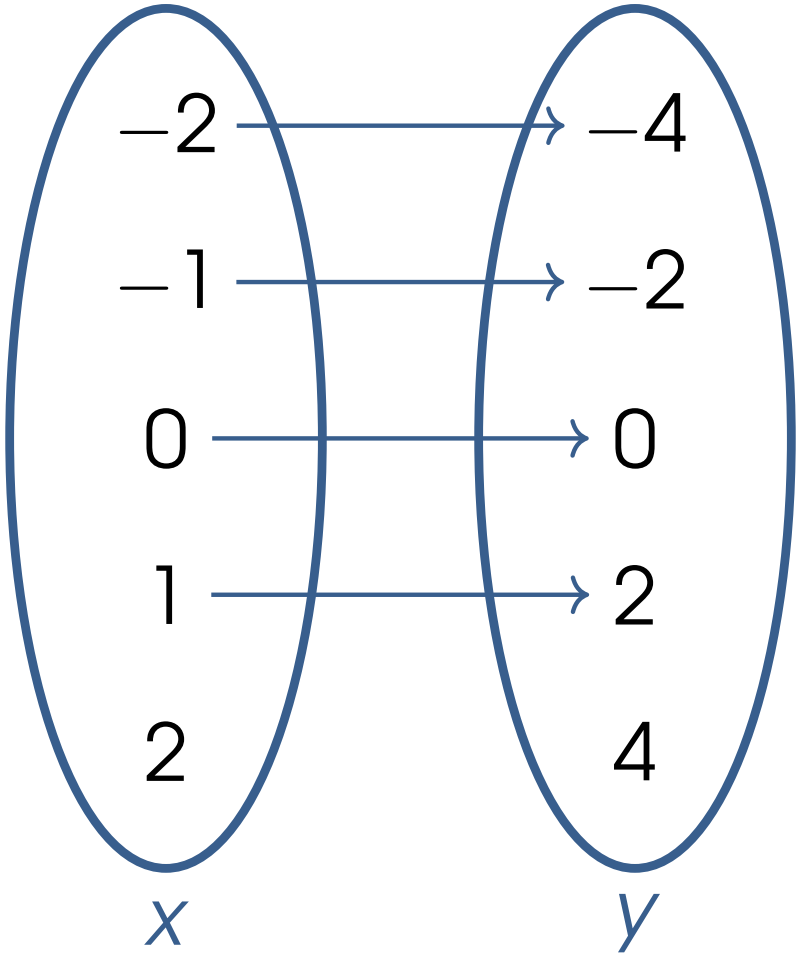

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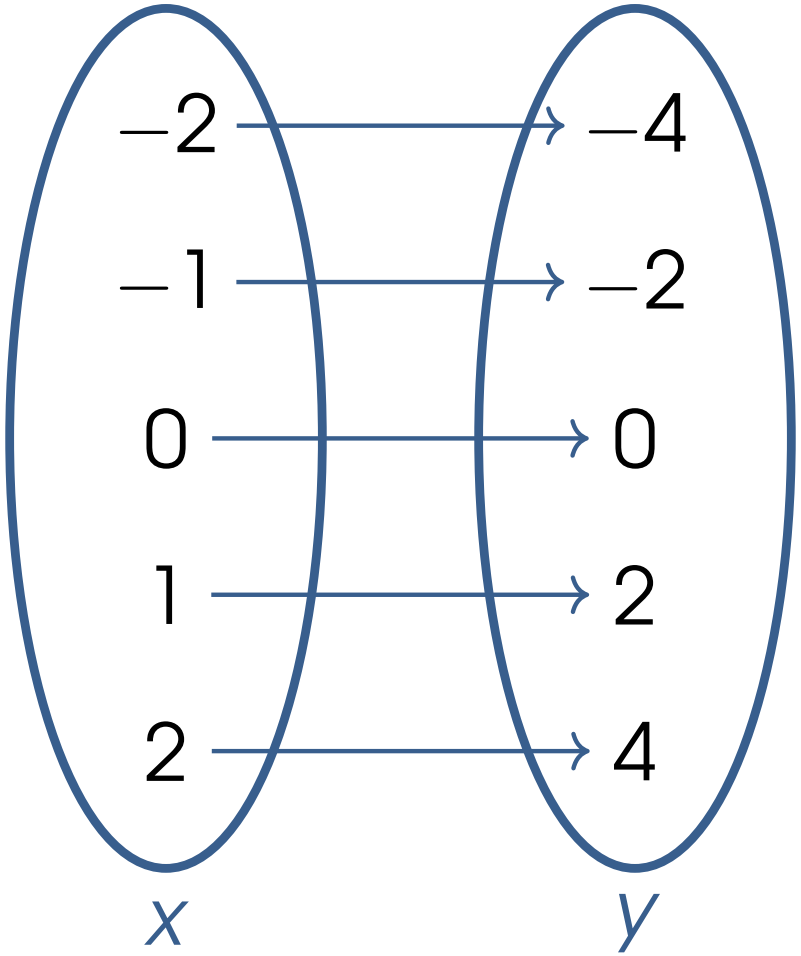

How to Represent Relations Using Graphs?

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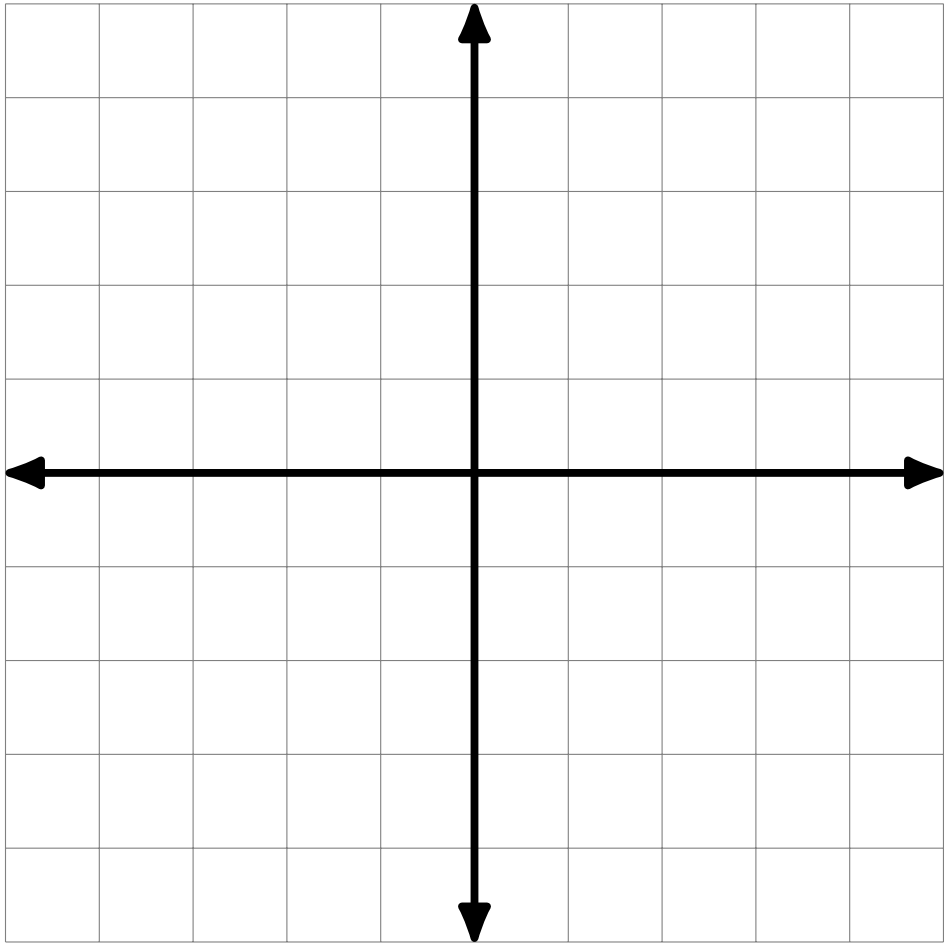

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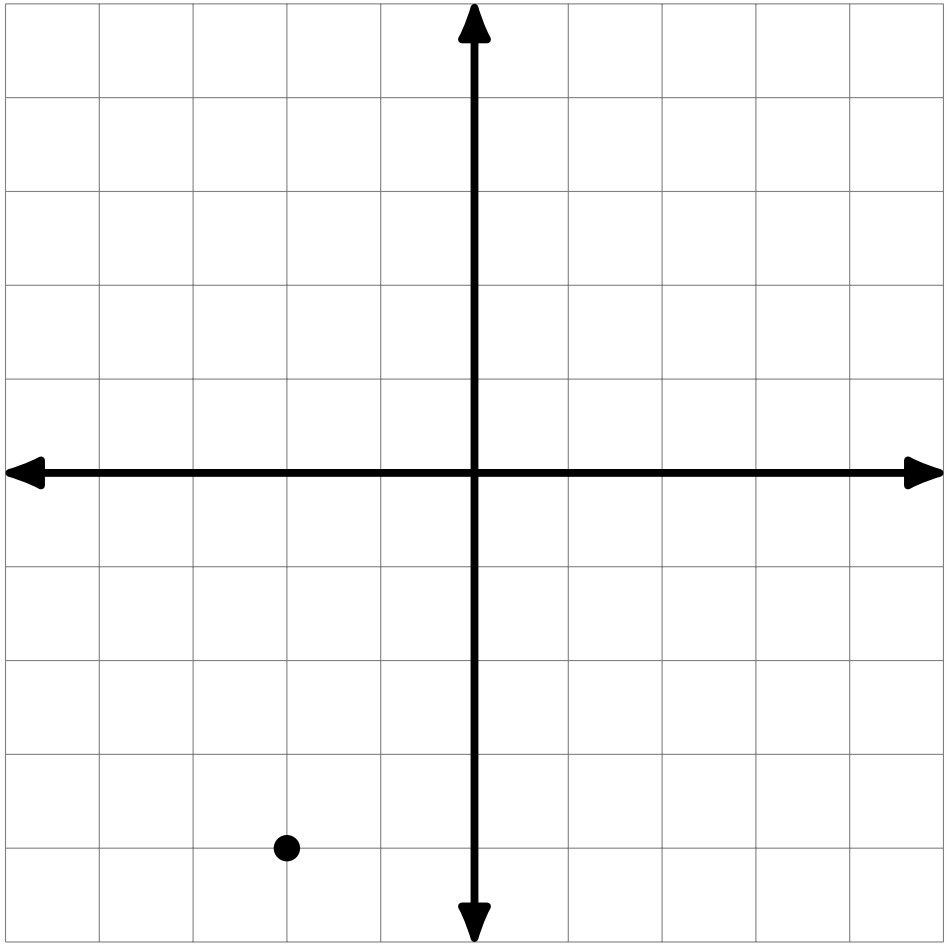

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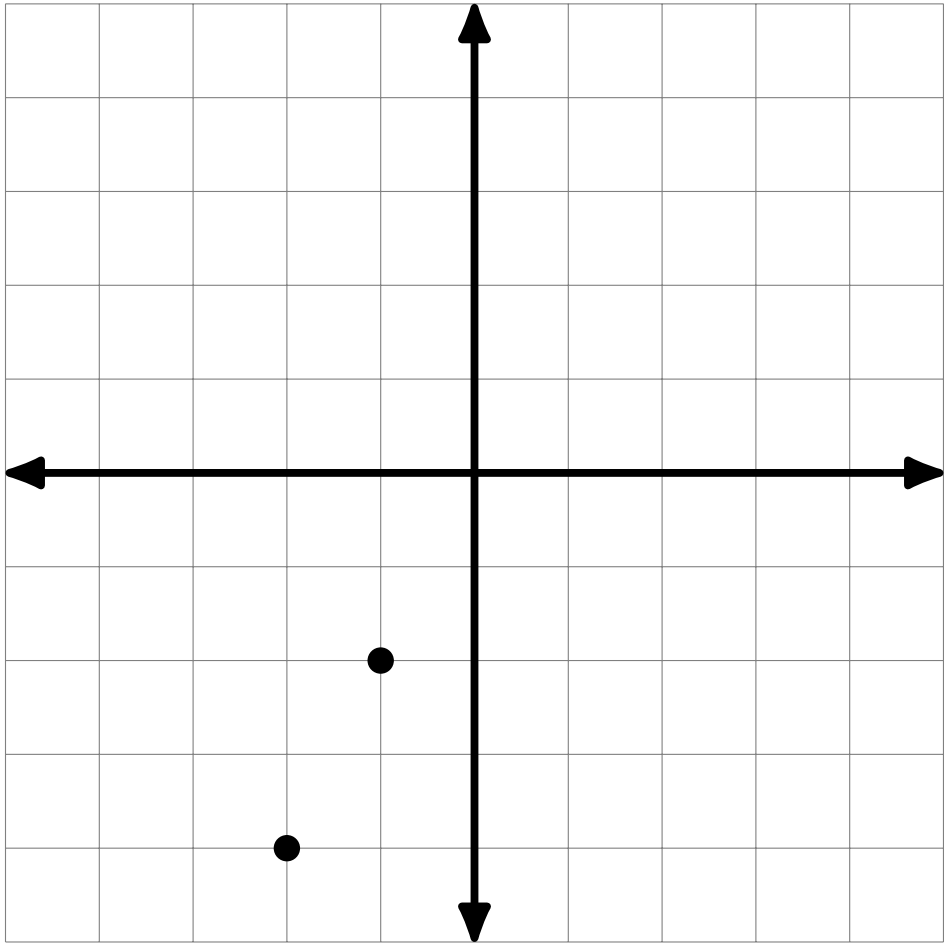

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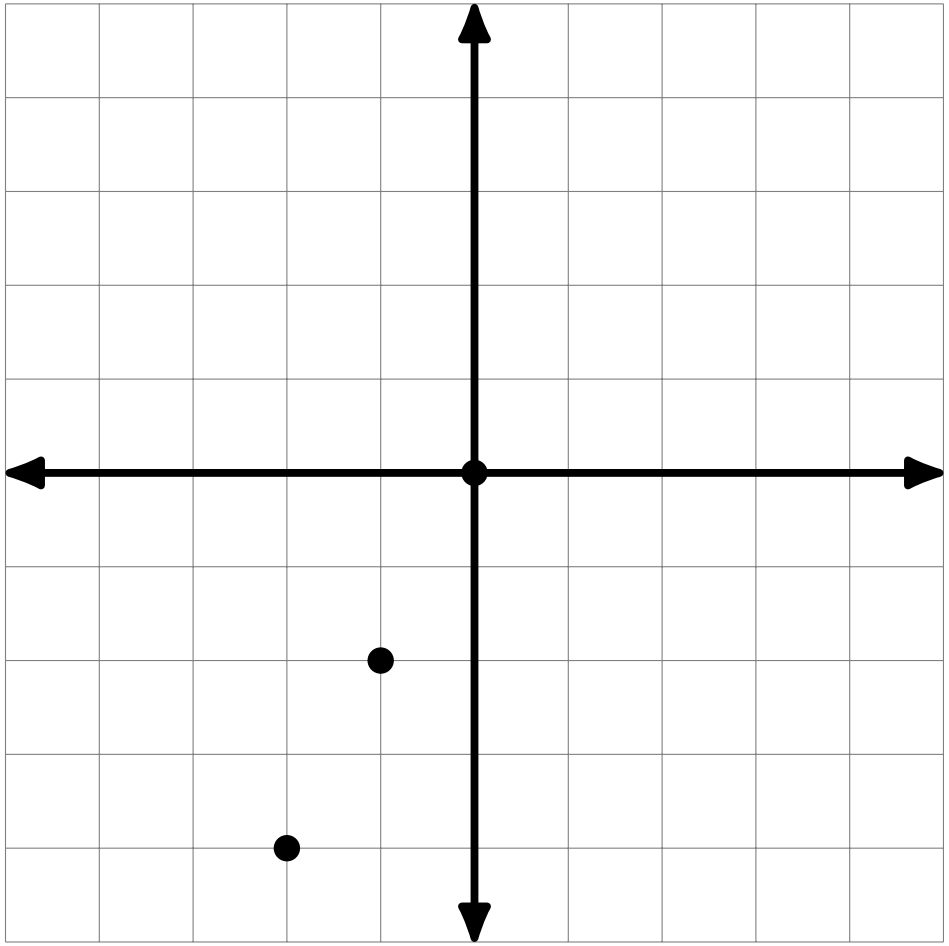

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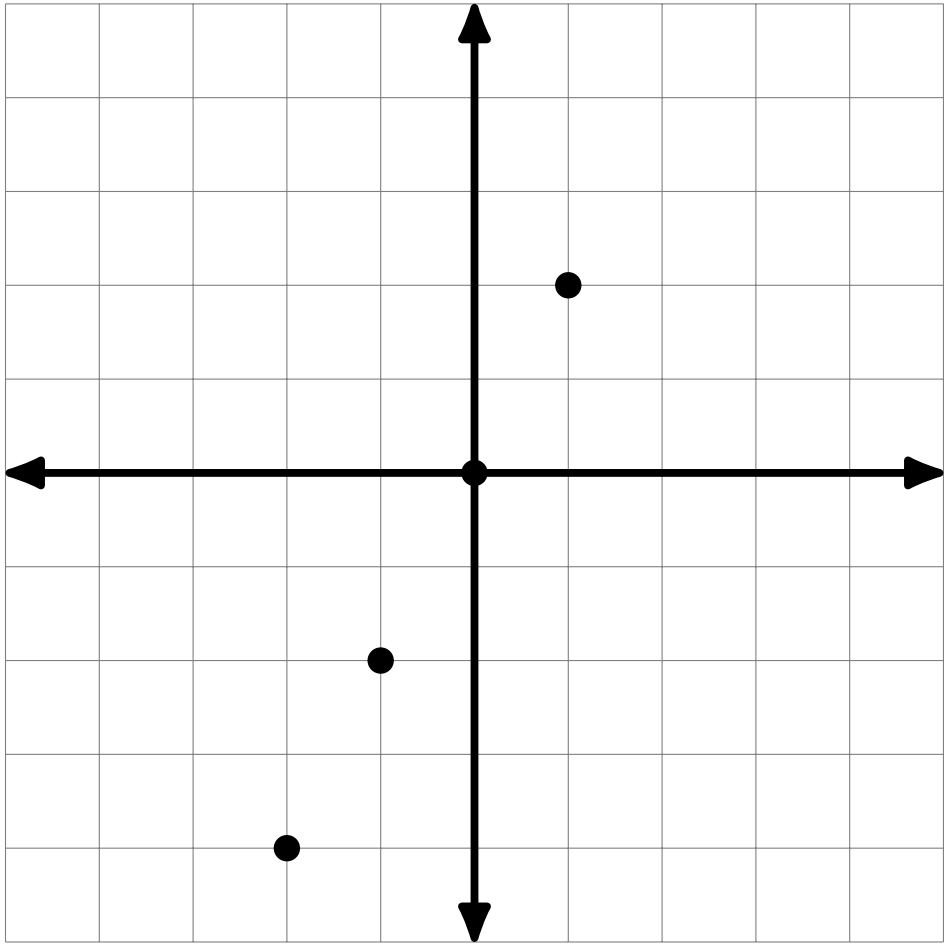

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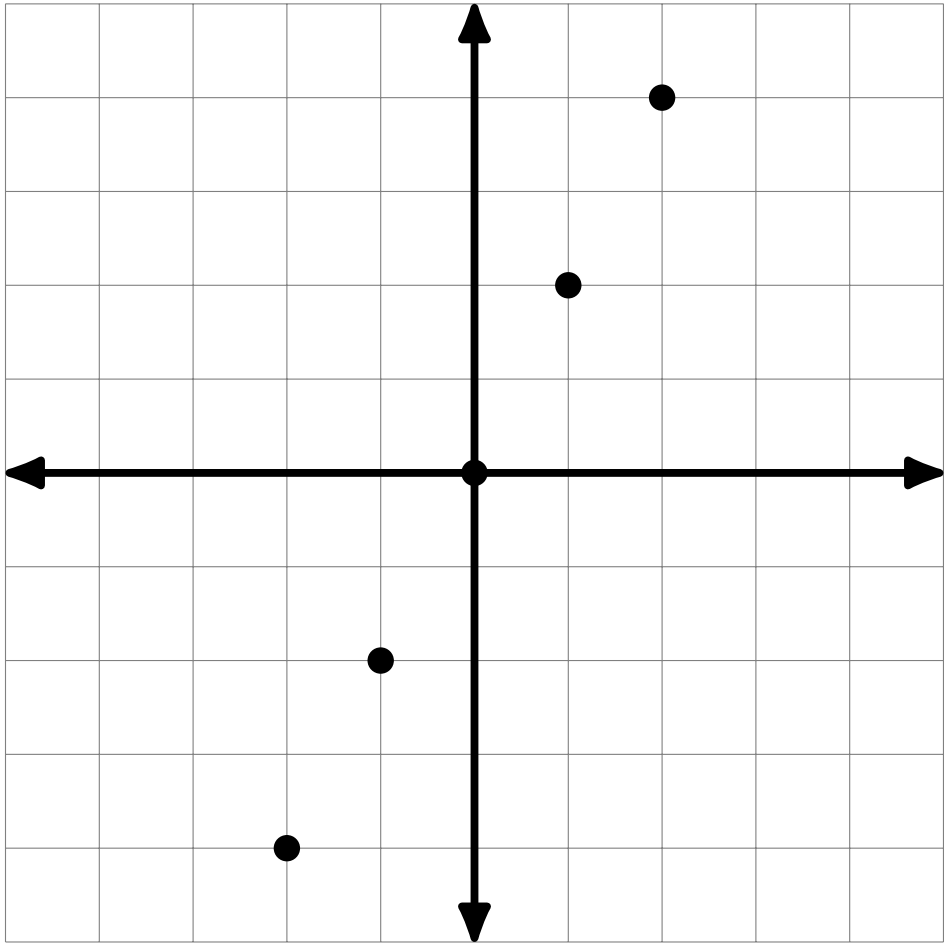

How to Represent Relations Using Rules?

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Rule: $y = 2x$, where x is an integer from -2 to 2

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Rule: $y = 2x$, where x is an integer from -2 to 2
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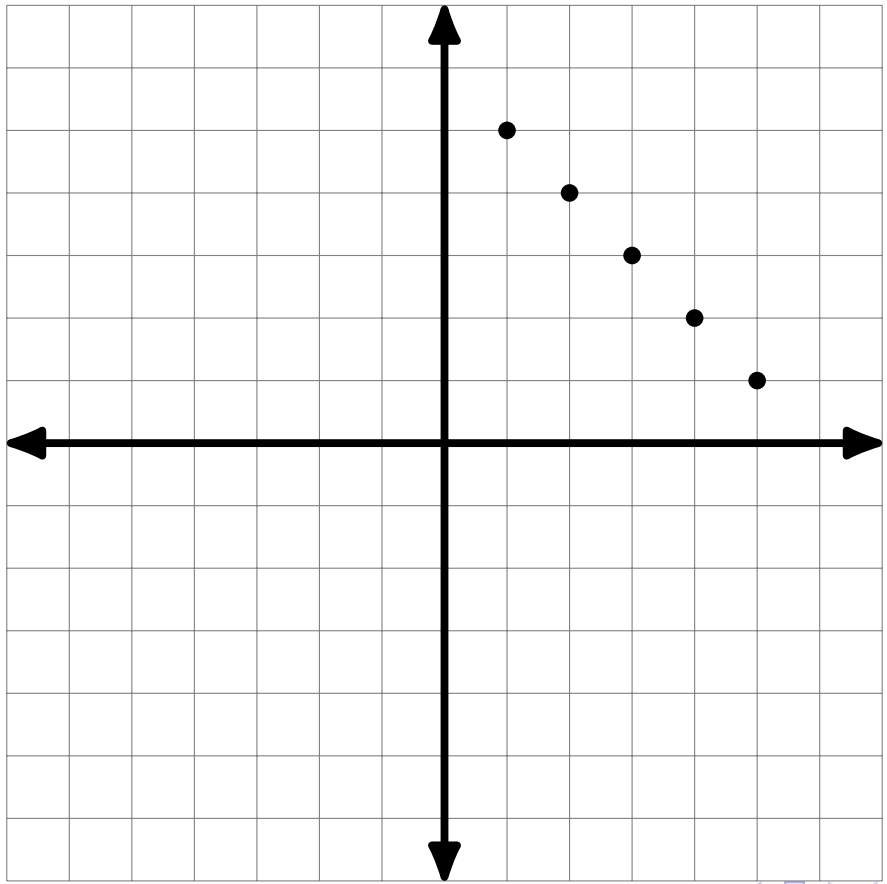
Rule: $y = 2x$, where x is an integer from -2 to 2
or in set notation:

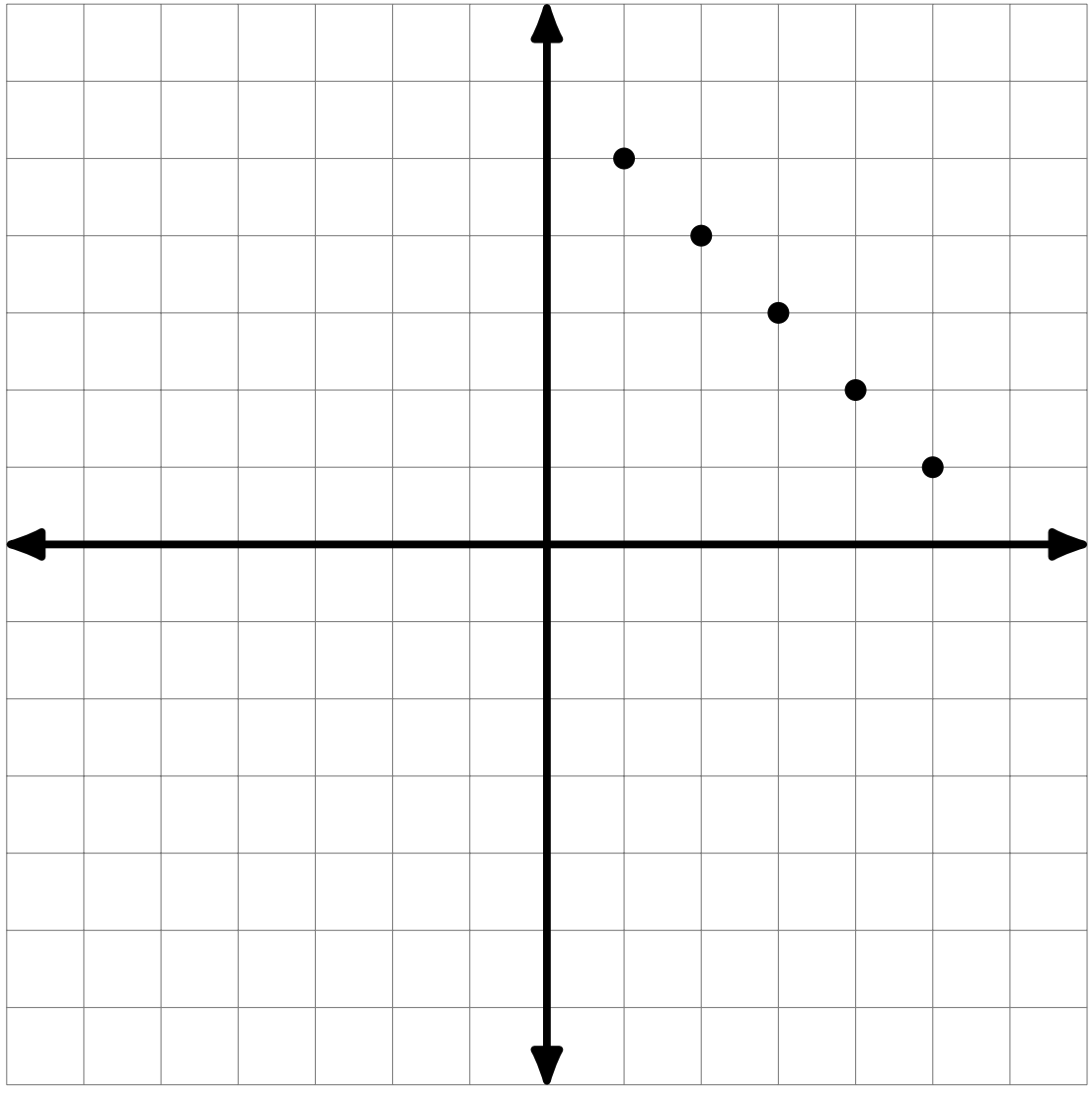
$$\{(x,y)|y = 2x, x \in \mathbb{Z}, -2 \leq x \leq 2\}$$

Example 3

Given the graph, complete the set of ordered pairs and the table of values, draw the mapping diagram, and generate the rule.



Example 3



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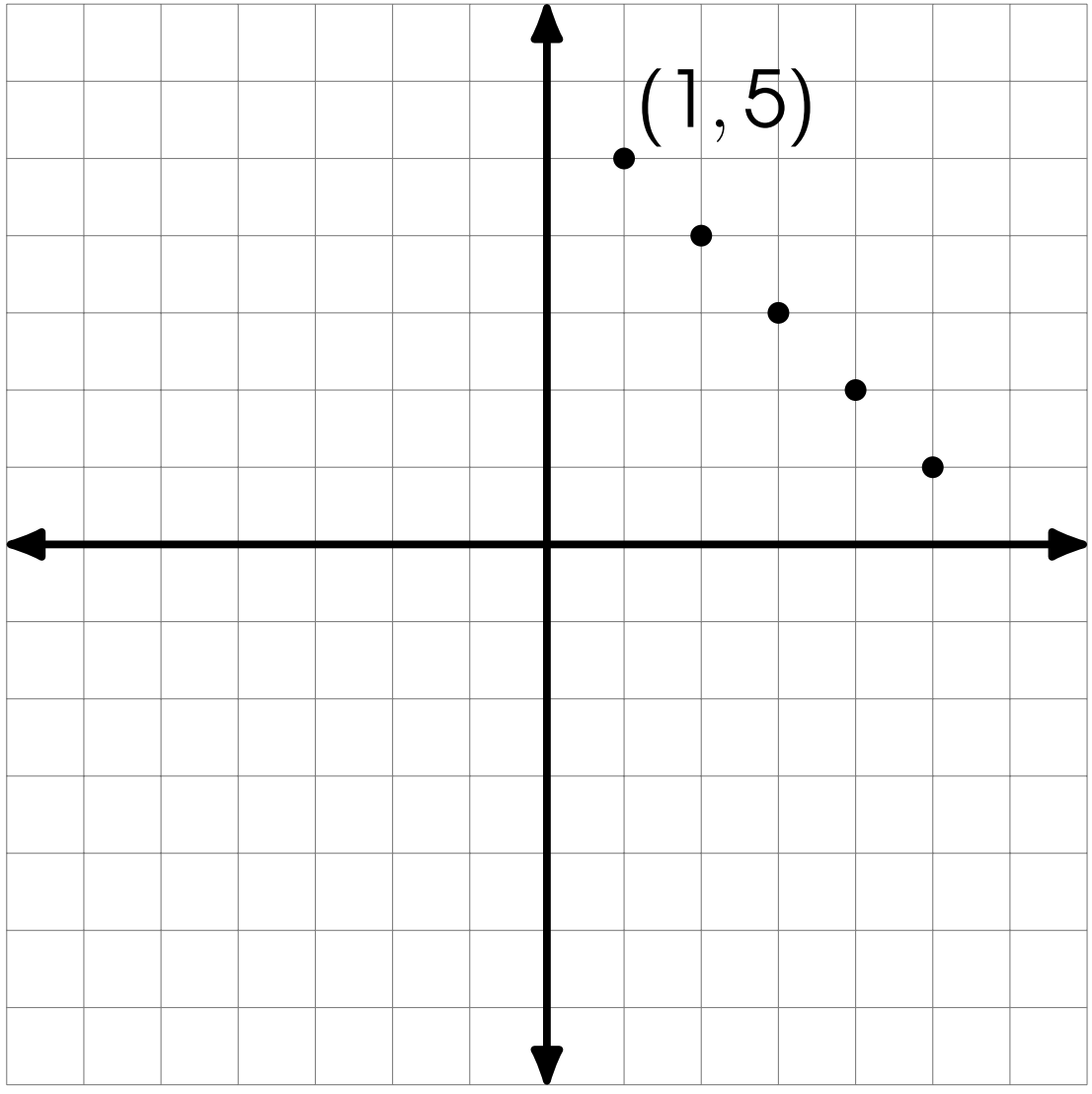
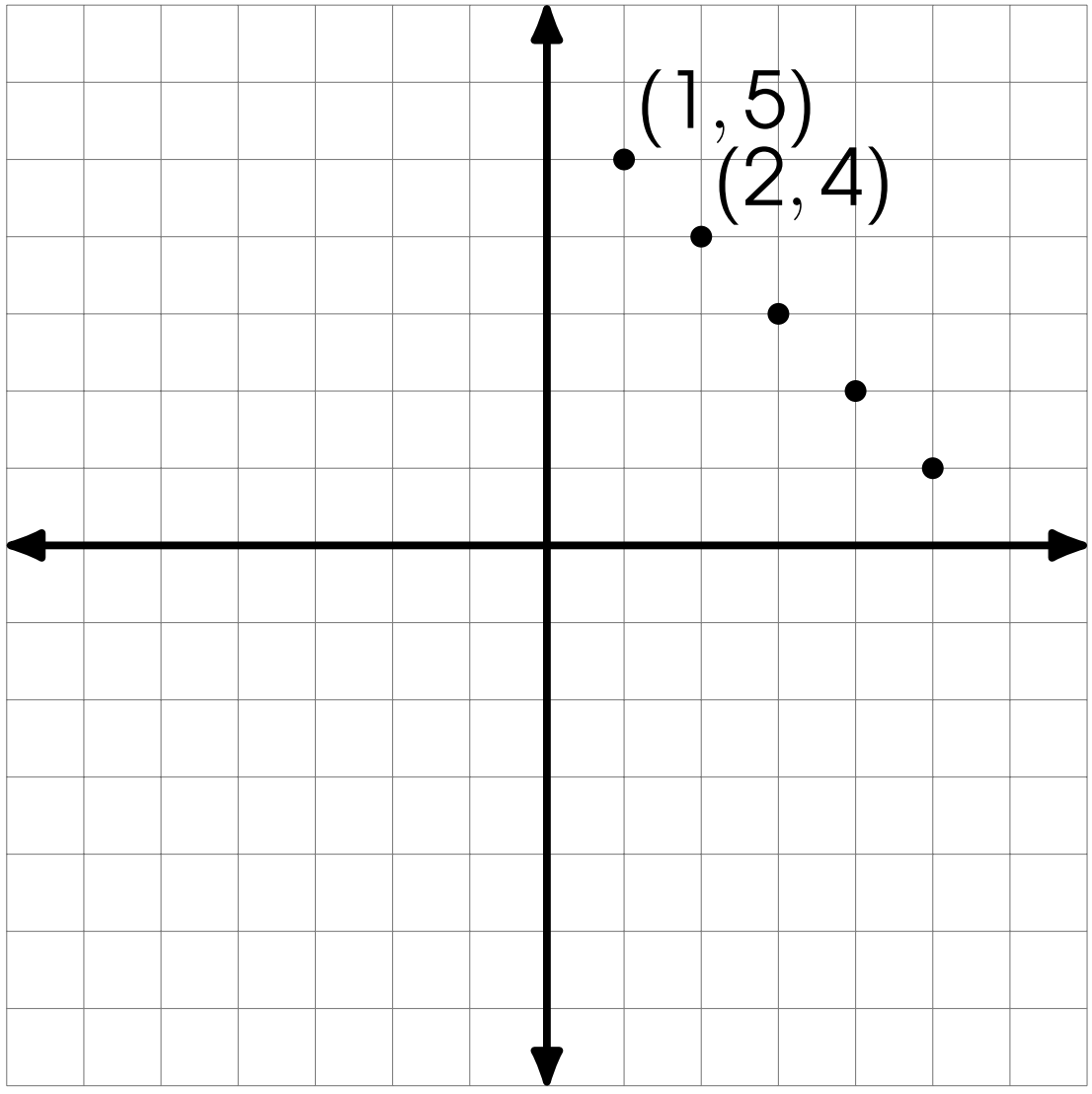


Example 3



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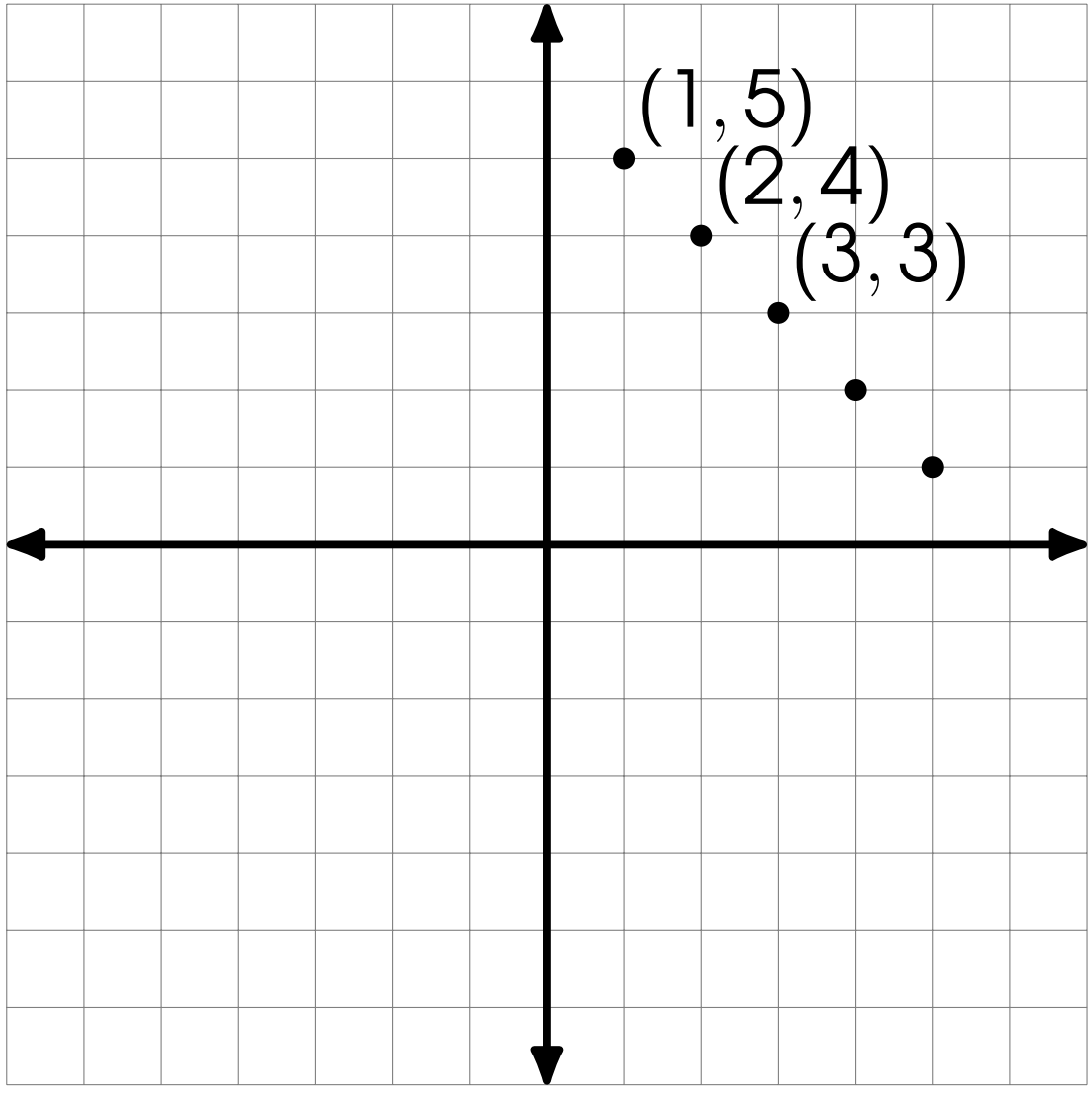

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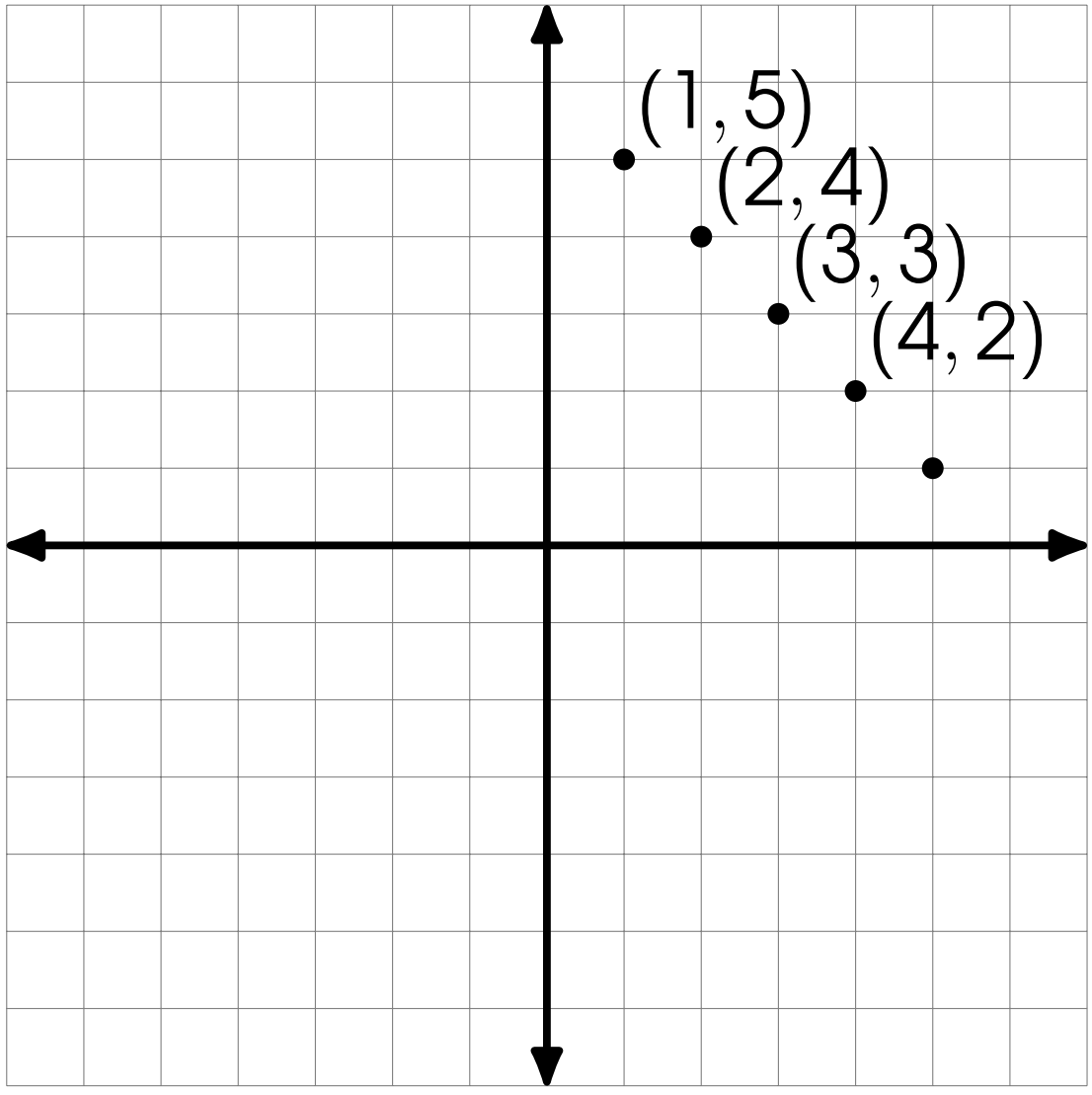

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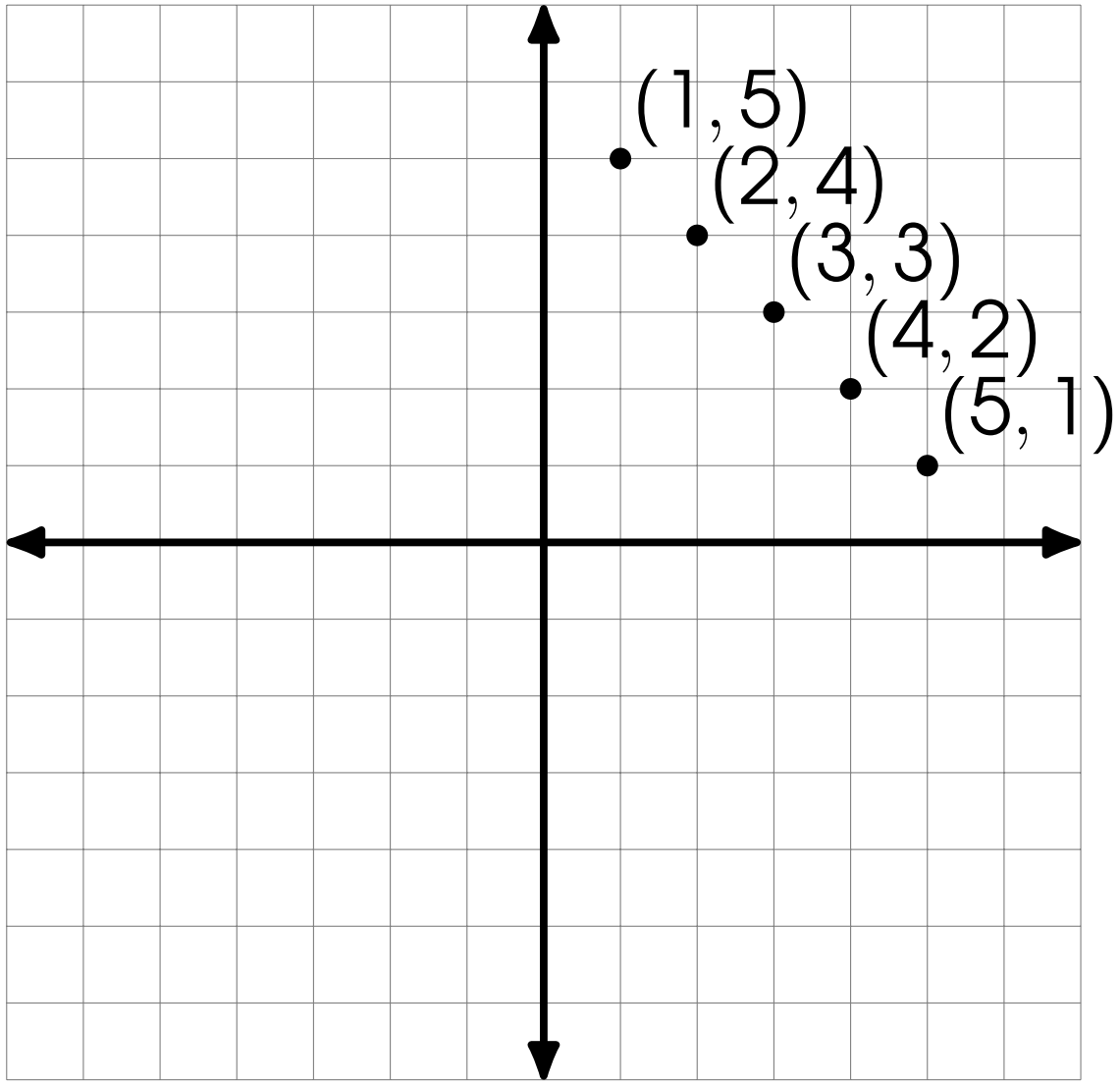

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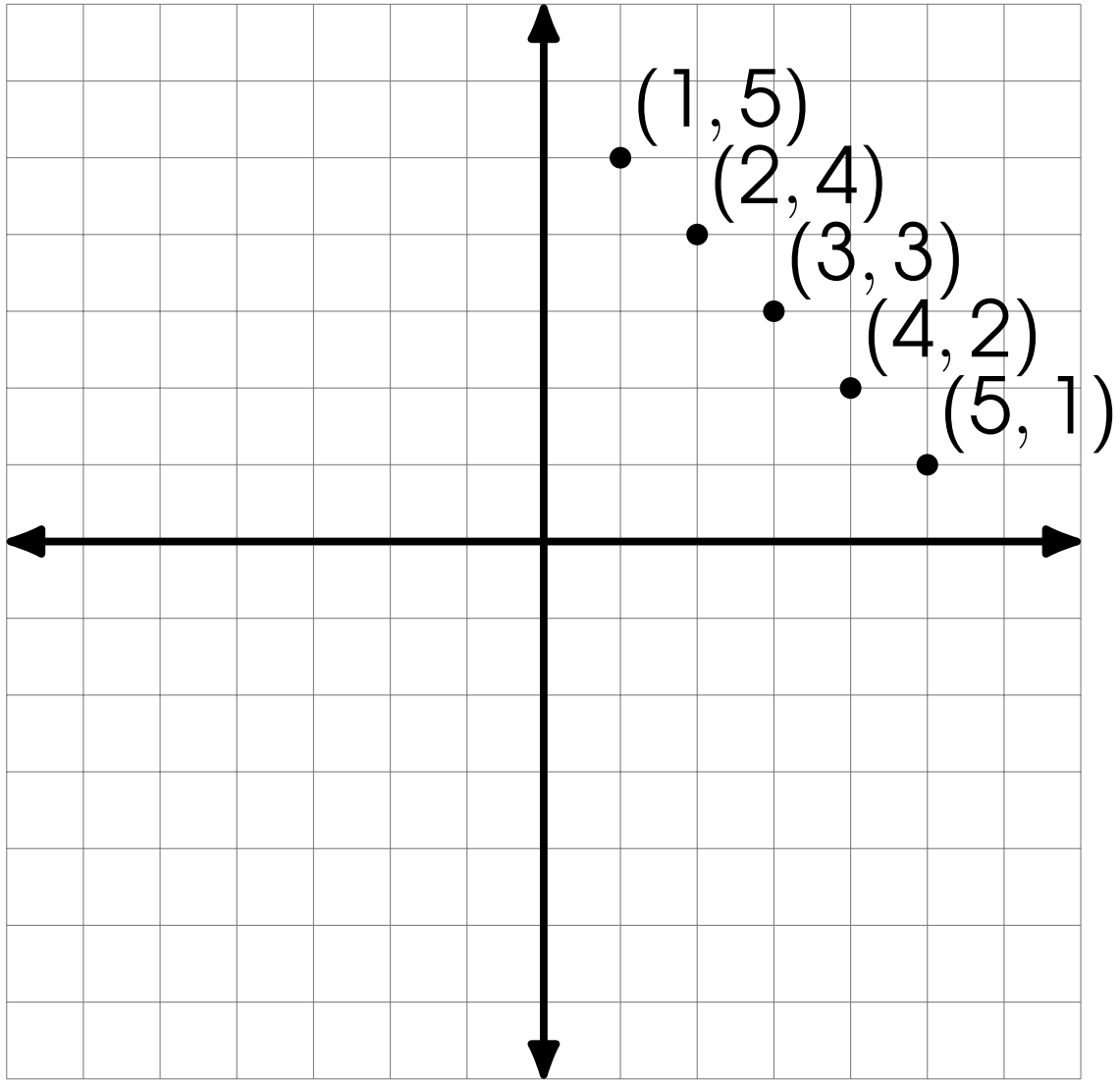

$\{(1,5),(2,4),(3,3),(4,2),(5,1)\}$

Example 3

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

Example 3

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

x	y

Example 3

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

x	**y**
1	5

Example 3

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

x	y
1	5
2	4

Example 3

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

x	**y**
1	5
2	4
3	3

Example 3

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

x	y
1	5
2	4
3	3
4	2

Example 3

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

x	y
1	5
2	4
3	3
4	2
5	1

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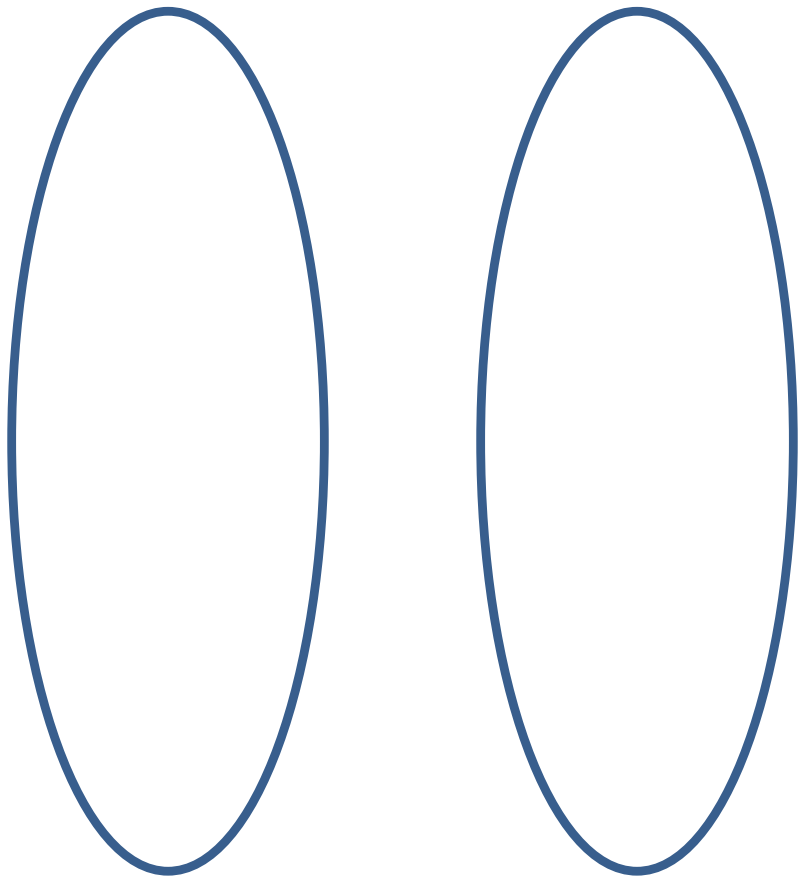

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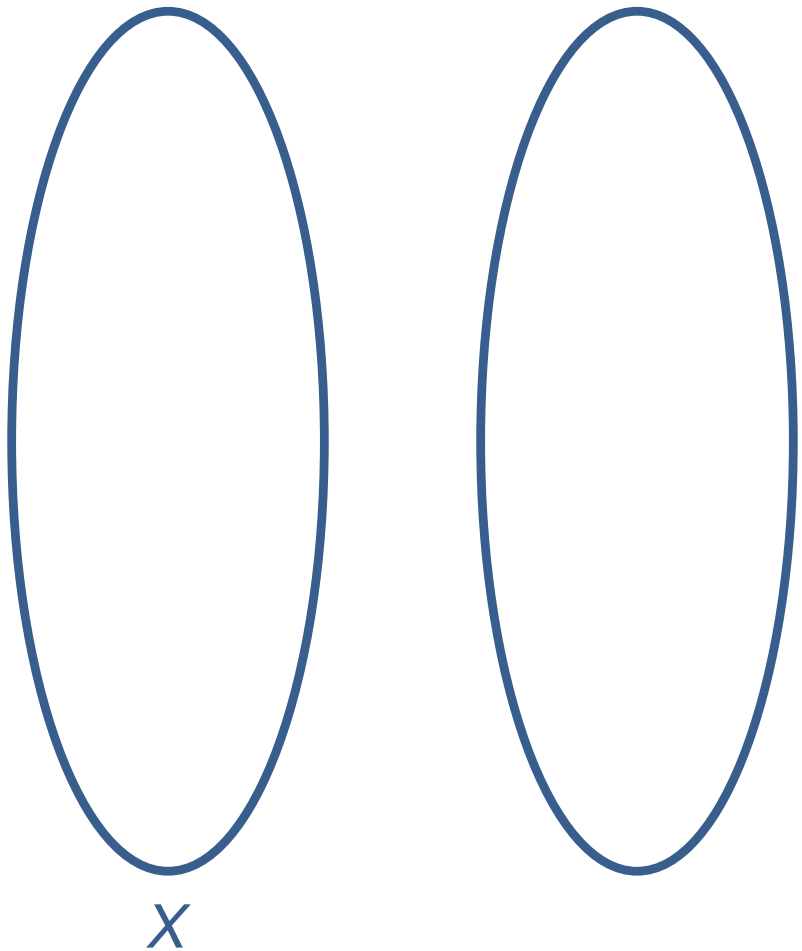

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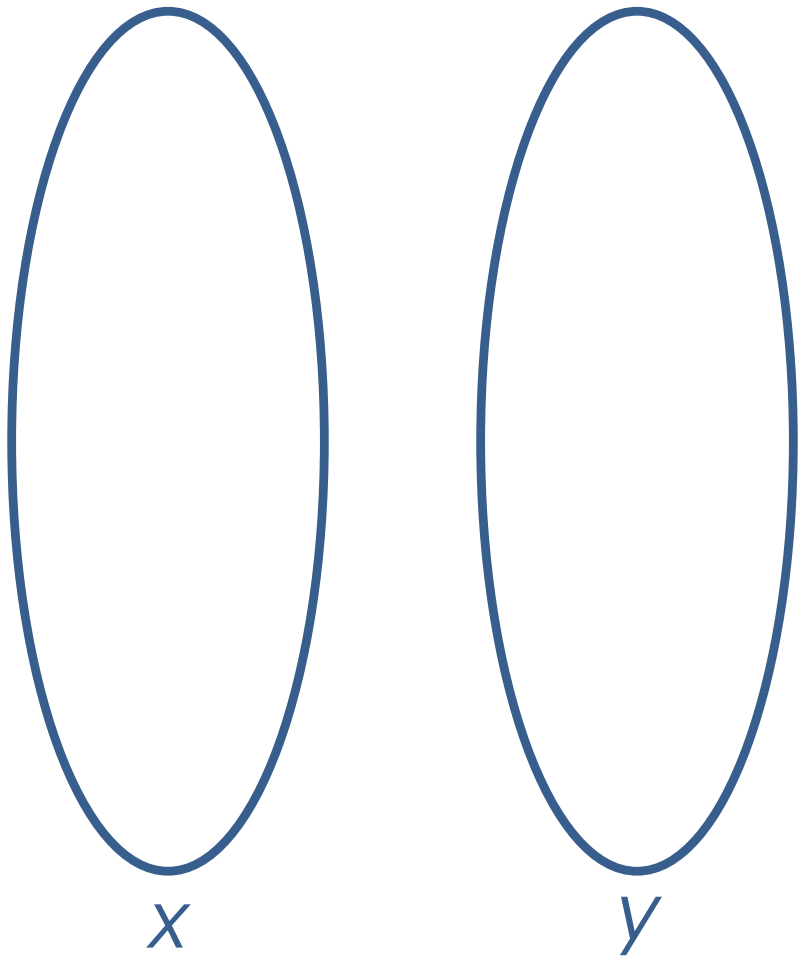

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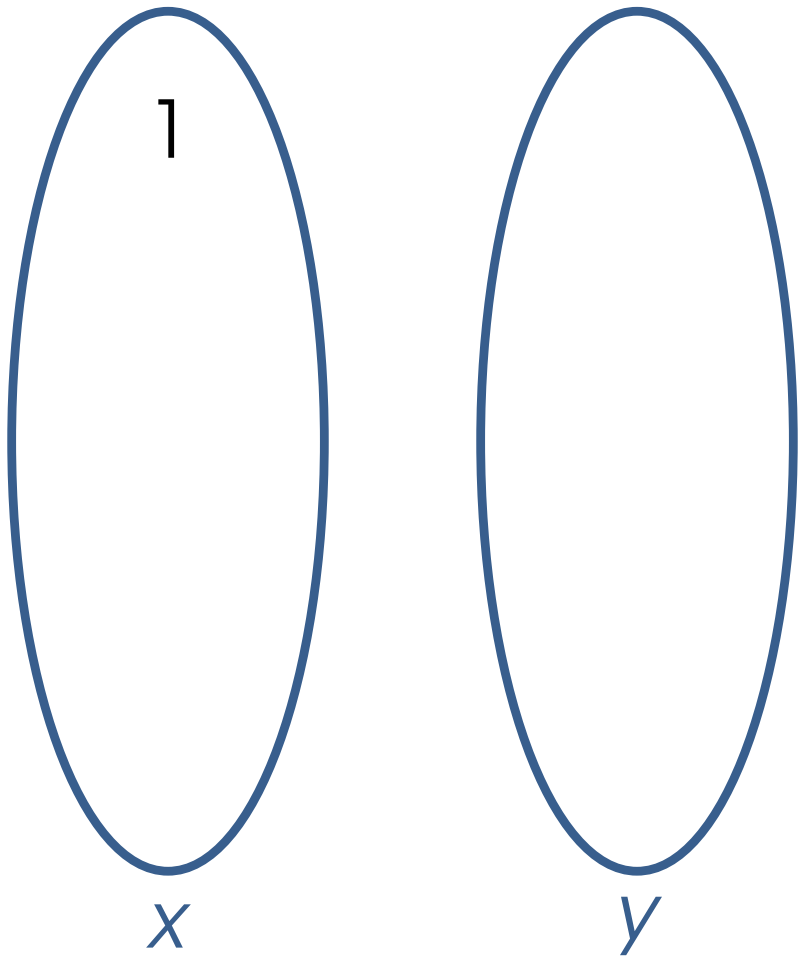

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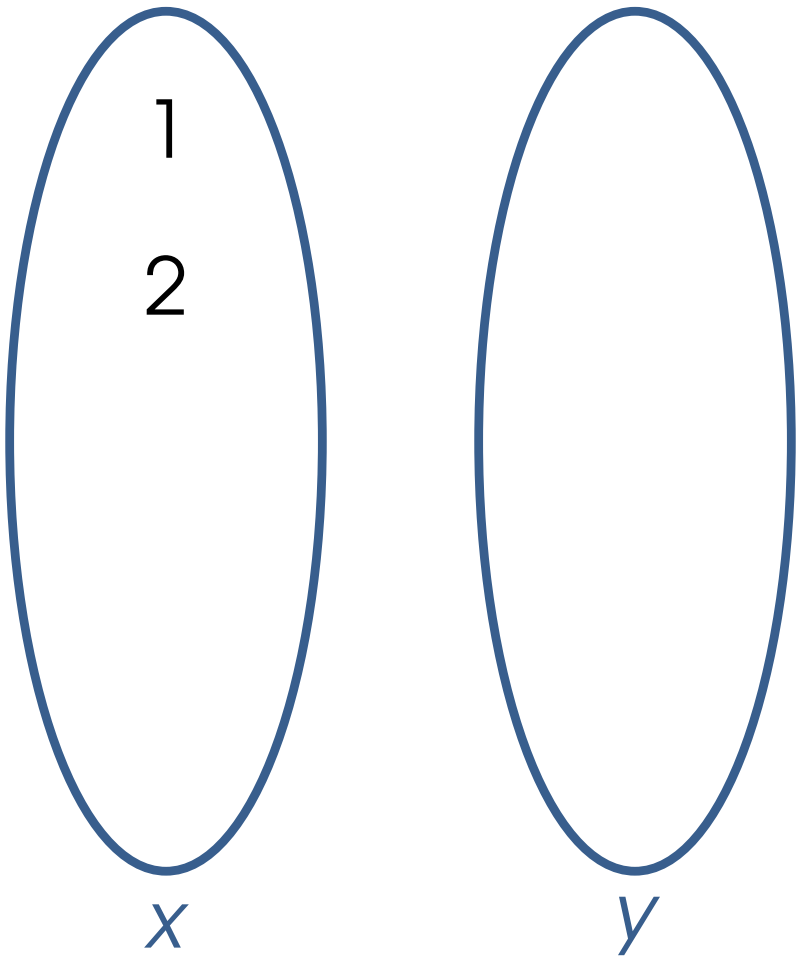

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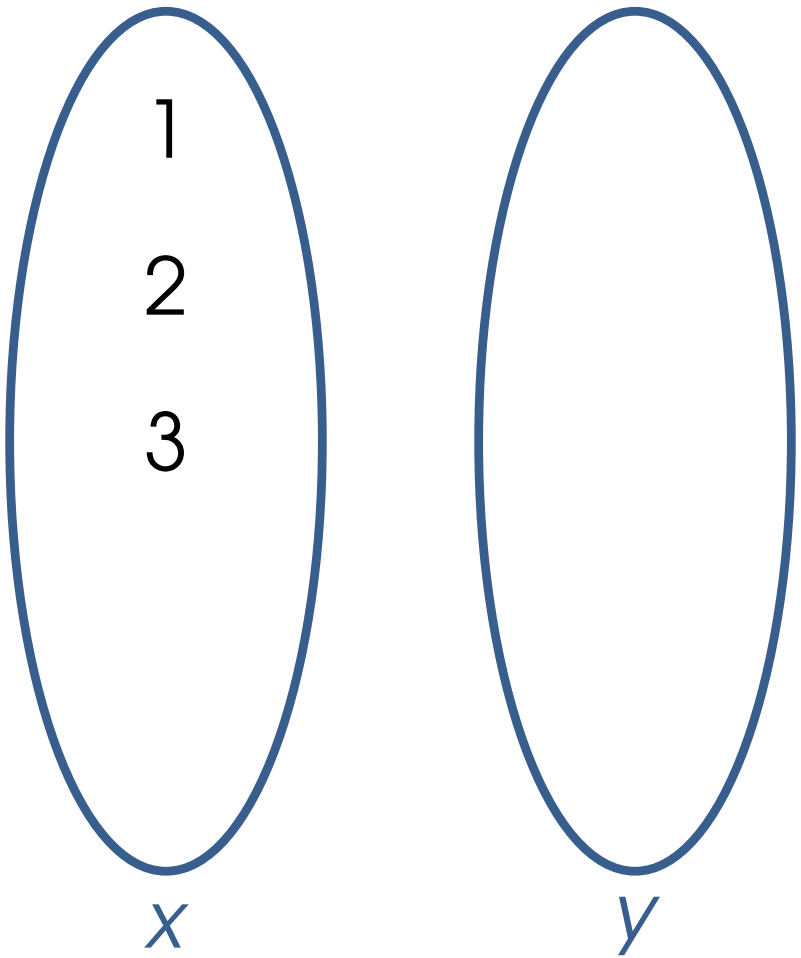

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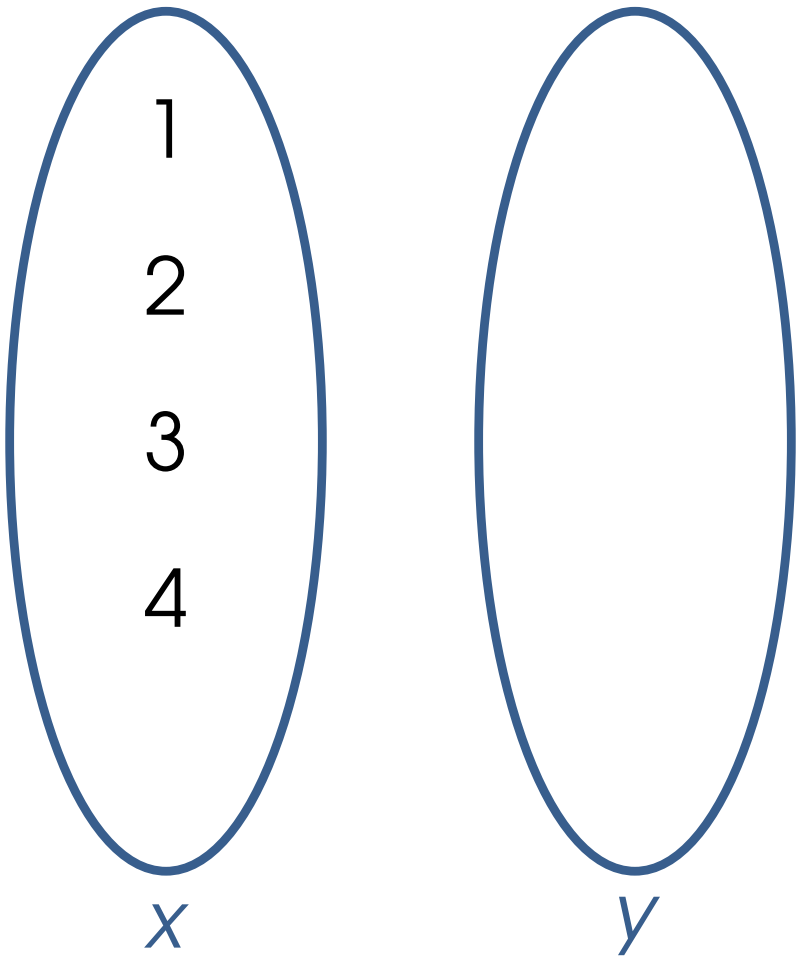

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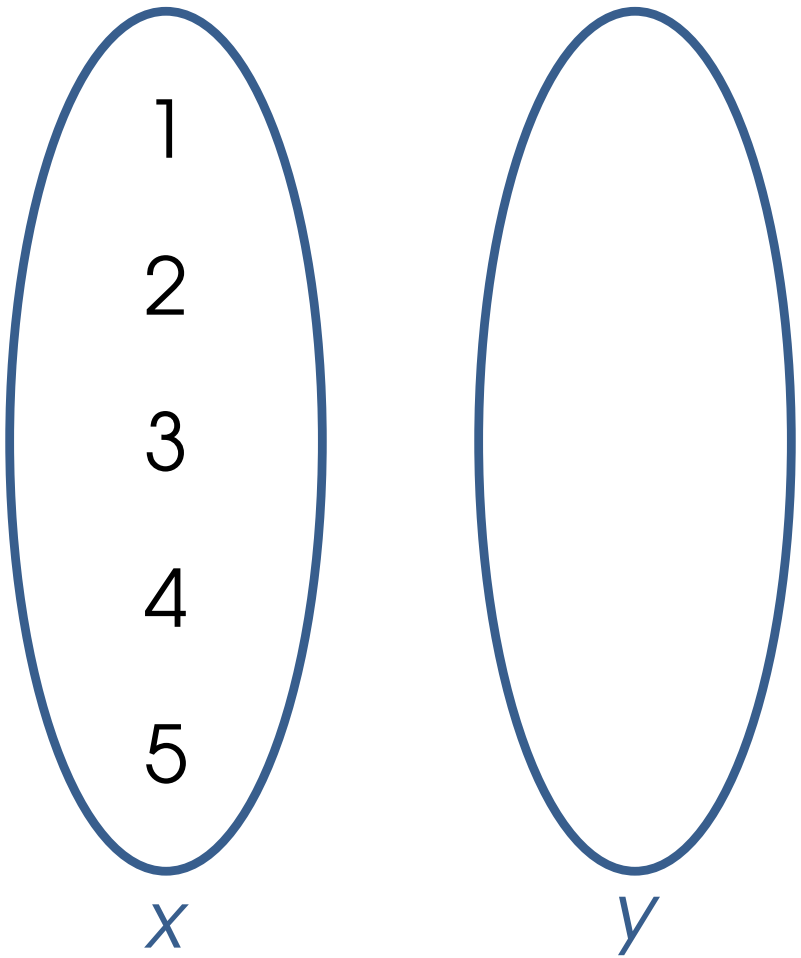

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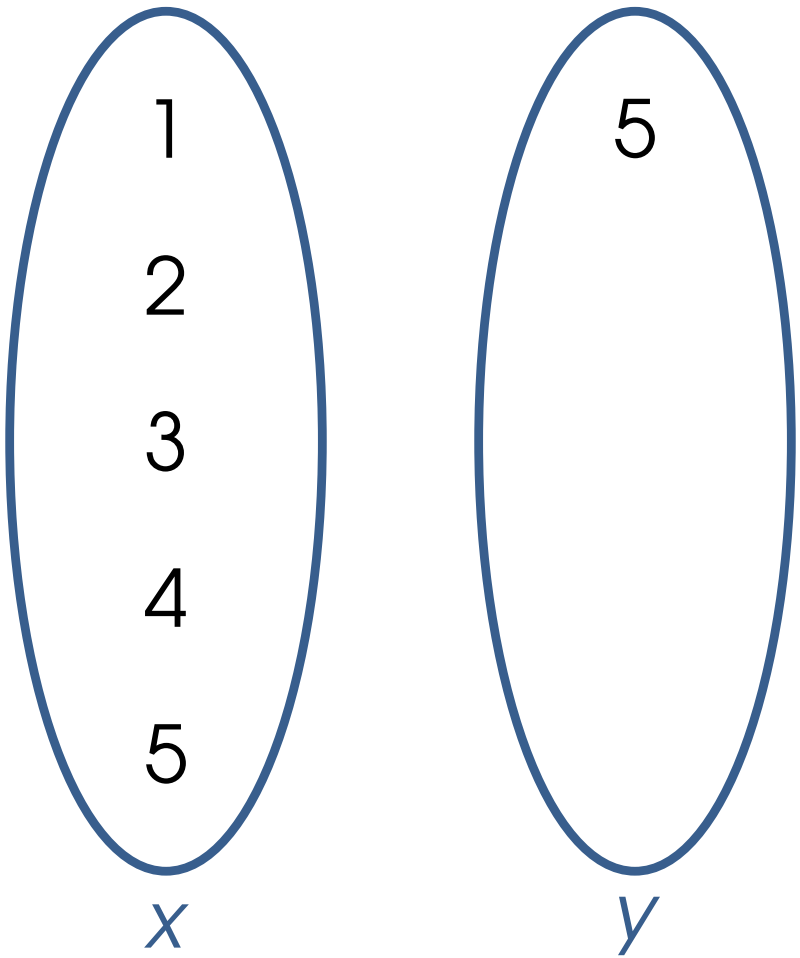

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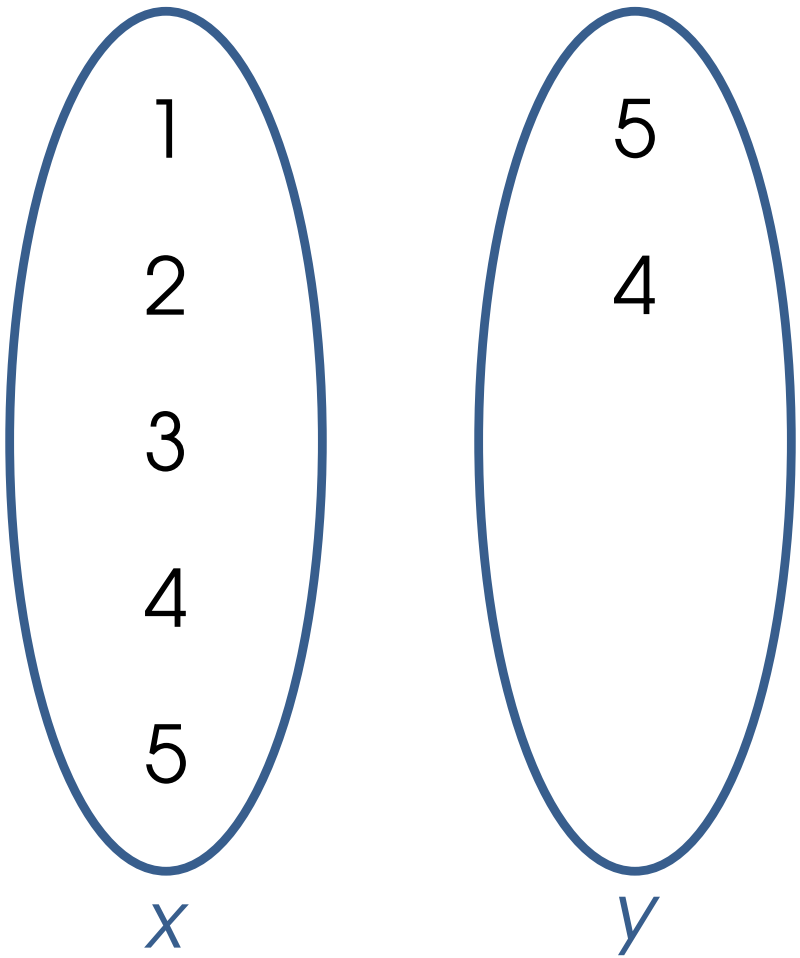

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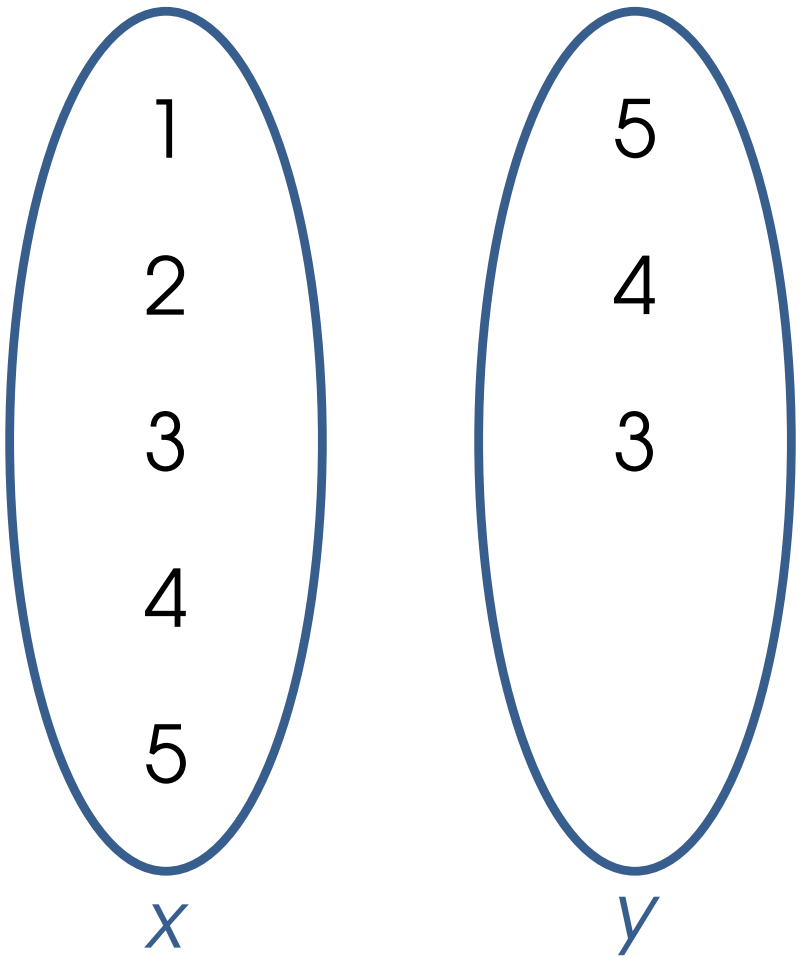

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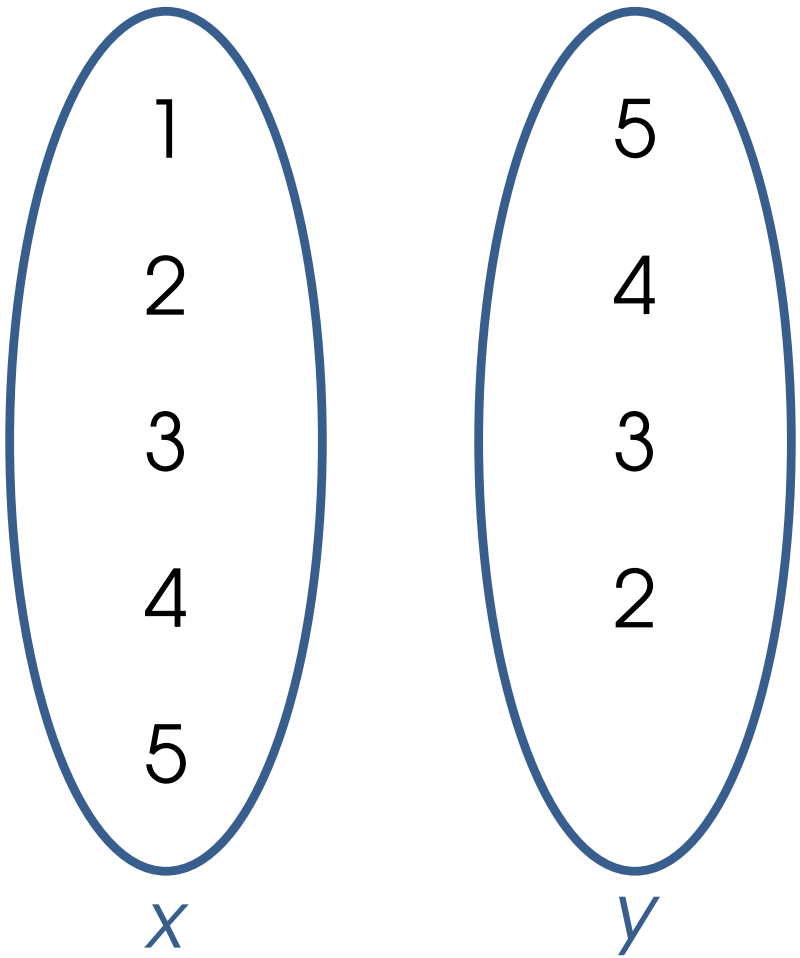

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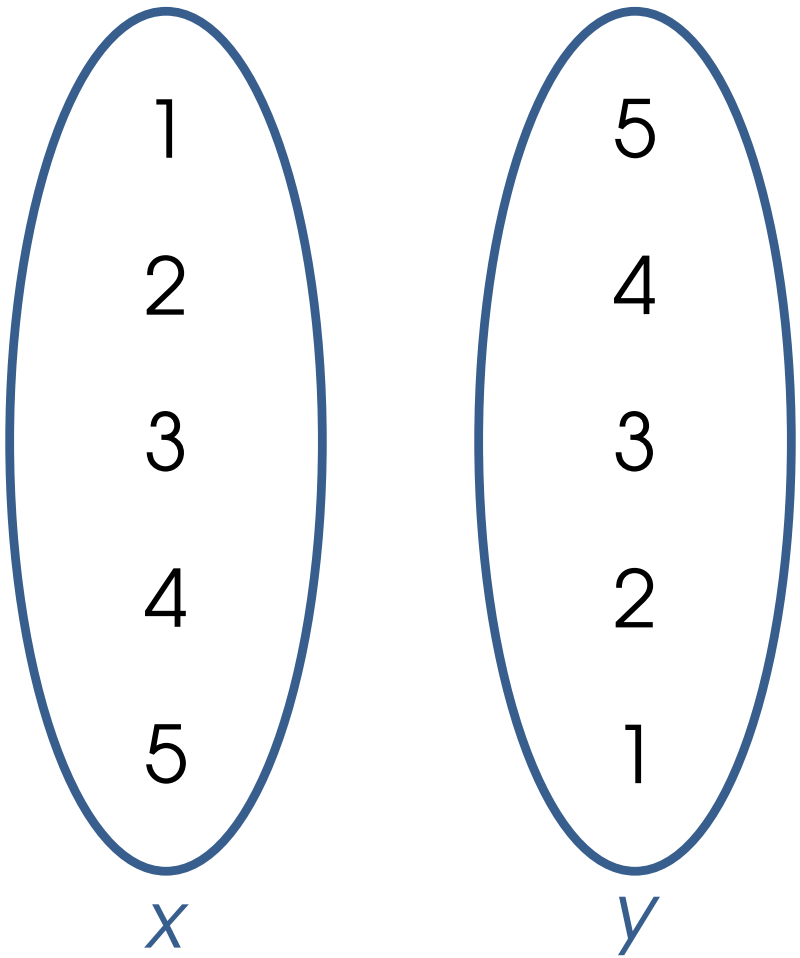

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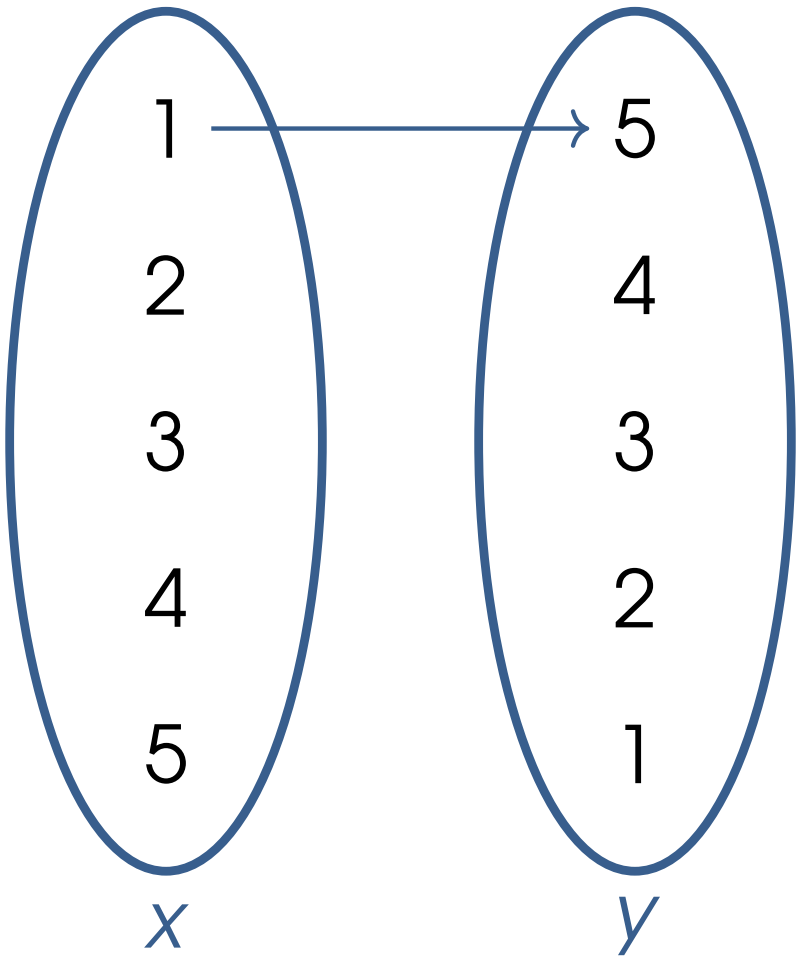

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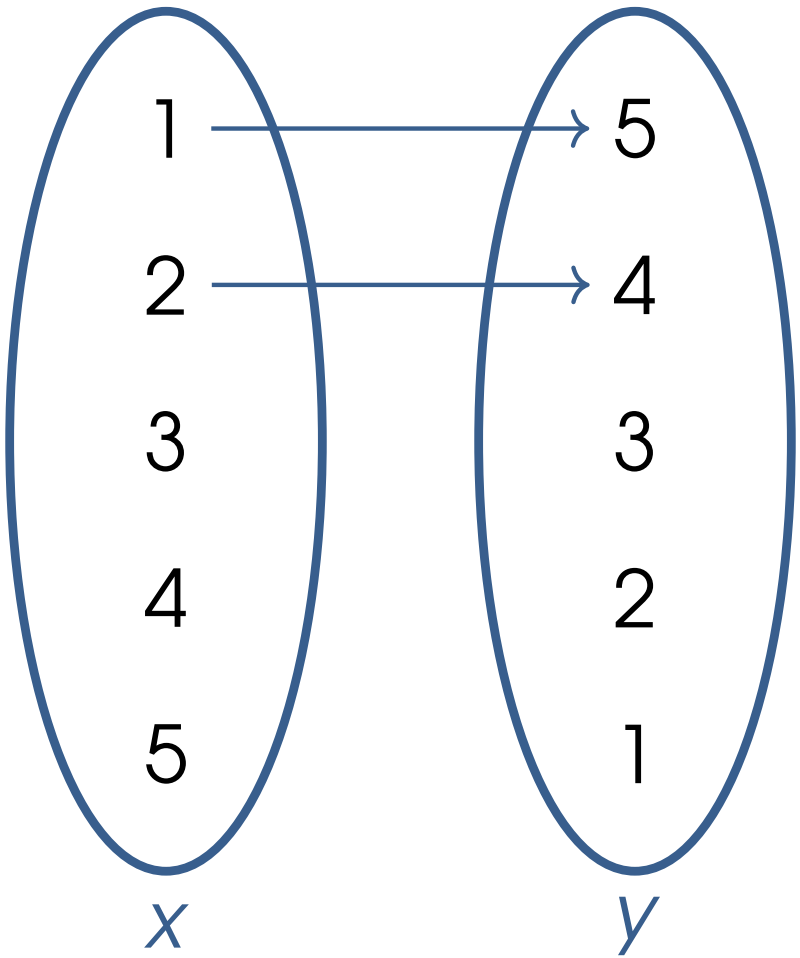

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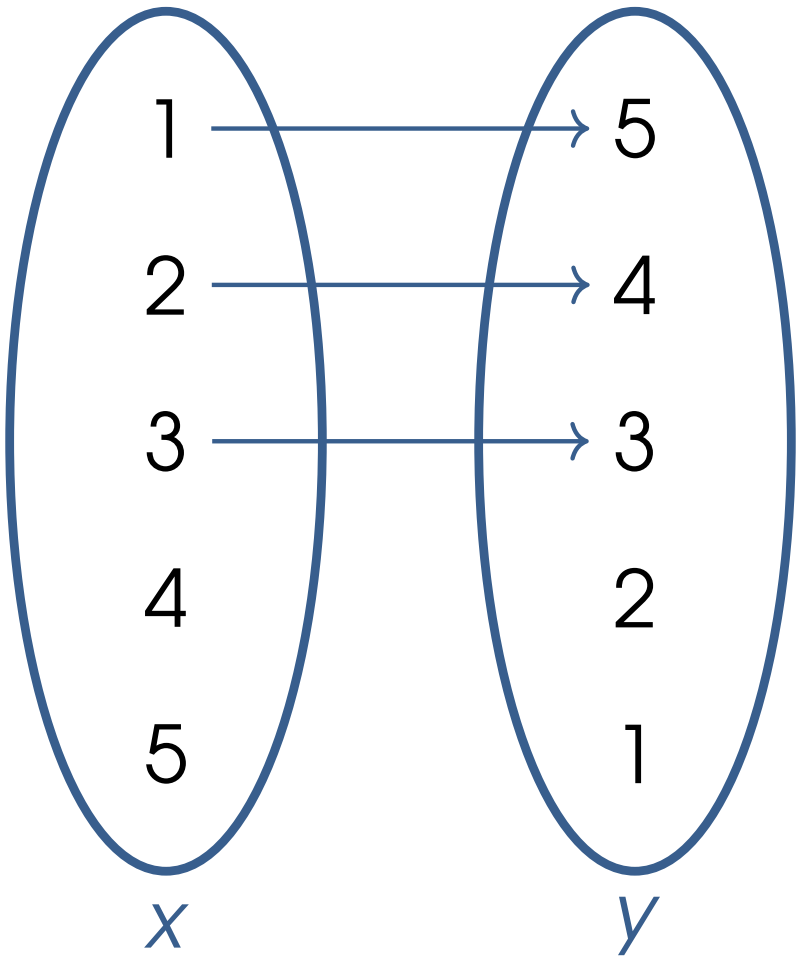

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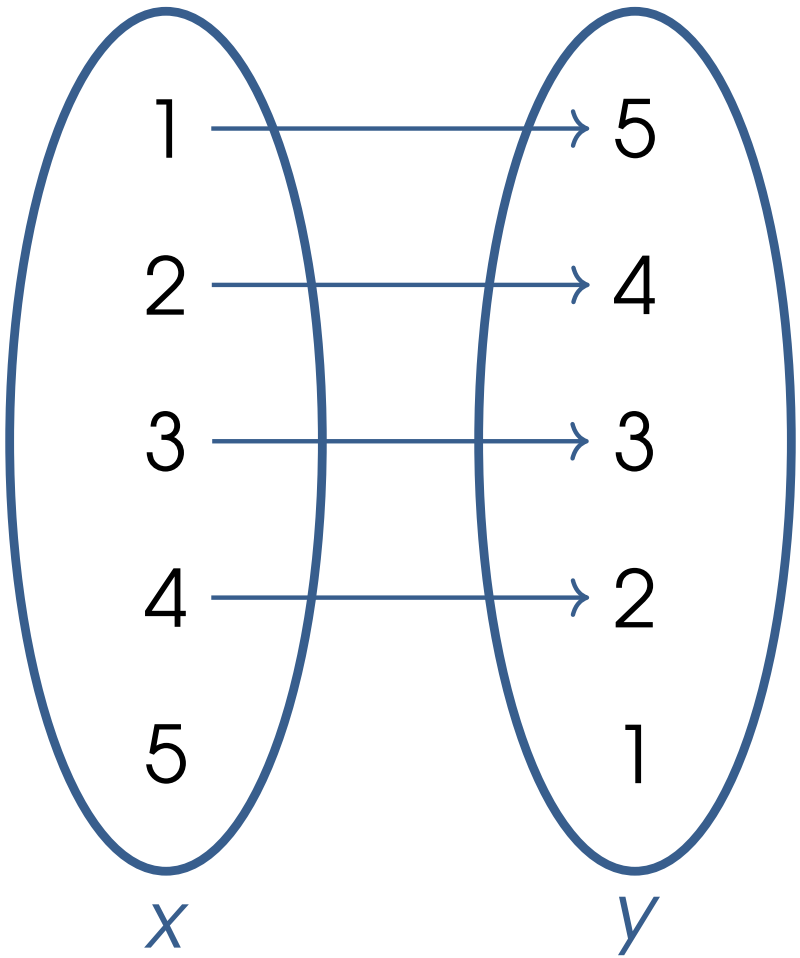

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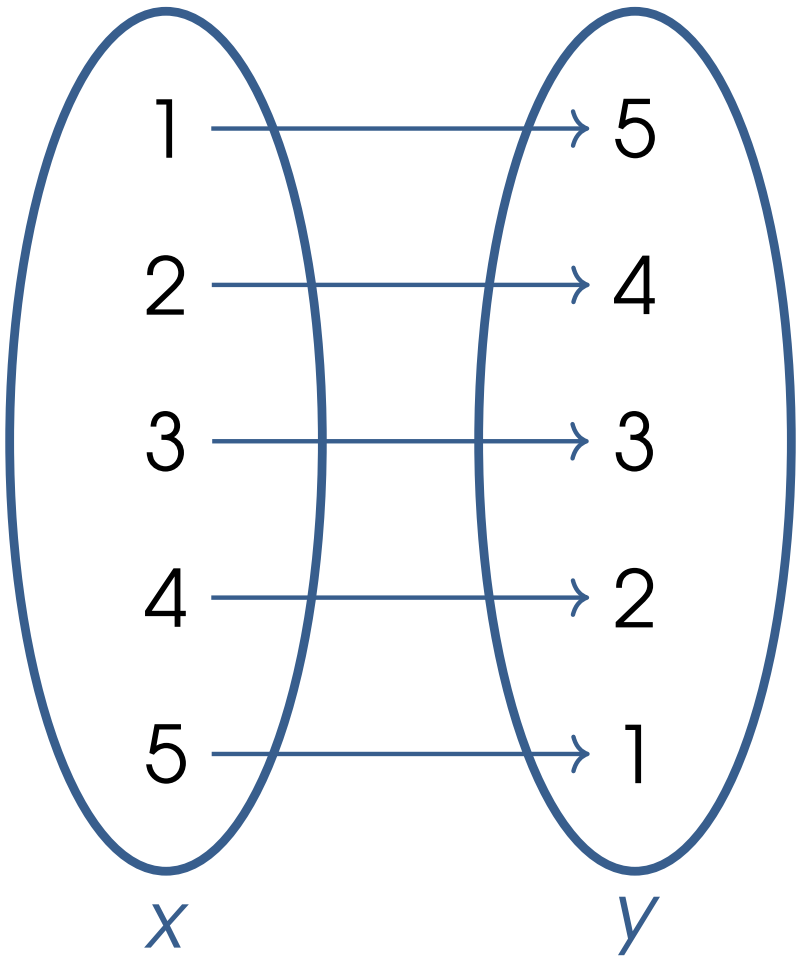

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$$\{(x,y)|y = -x + 6, x \in \mathbb{Z}, 1 \leq x \leq 5\}$$

What is the Domain and Range of a Relation?

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- Domain: the set of all first coordinates of a relation

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- Domain: the set of all first coordinates of a relation
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Example 4

Find the domain and range of the relation $\{(1, 40), (2, 80), (3, 120), (4, 160), (5, 200)\}$.

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Domain $= \{1, 2, 3, 4, 5\}$
Range $= \{40, 80, 120, 160, 200\}$

Example 5

Find the domain and range of the relation represented in this table.

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

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x	-2	-1	0	1	2
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Example 5

Find the domain and range of the relation represented in this table.

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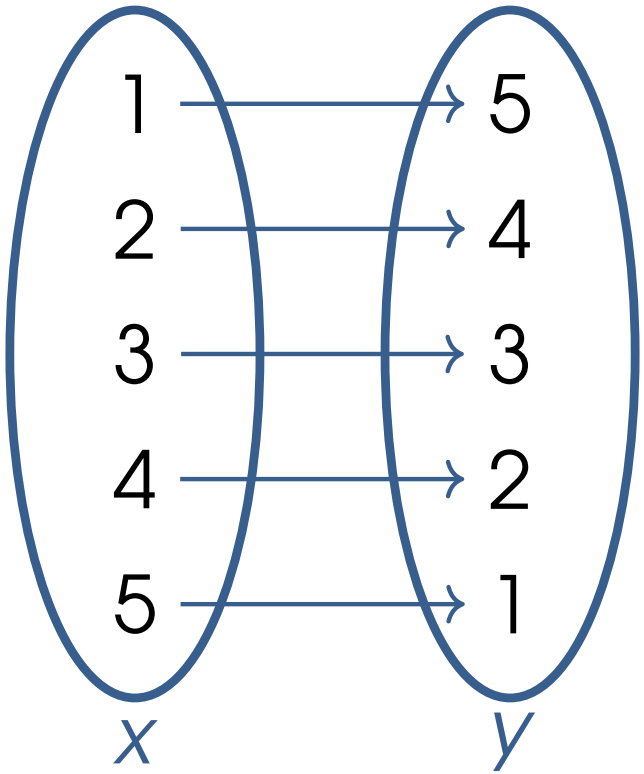
Domain $= \{-2, -1, 0, 1, 2\}$
Range $= \{-4, -2, 0, 2, 4\}$

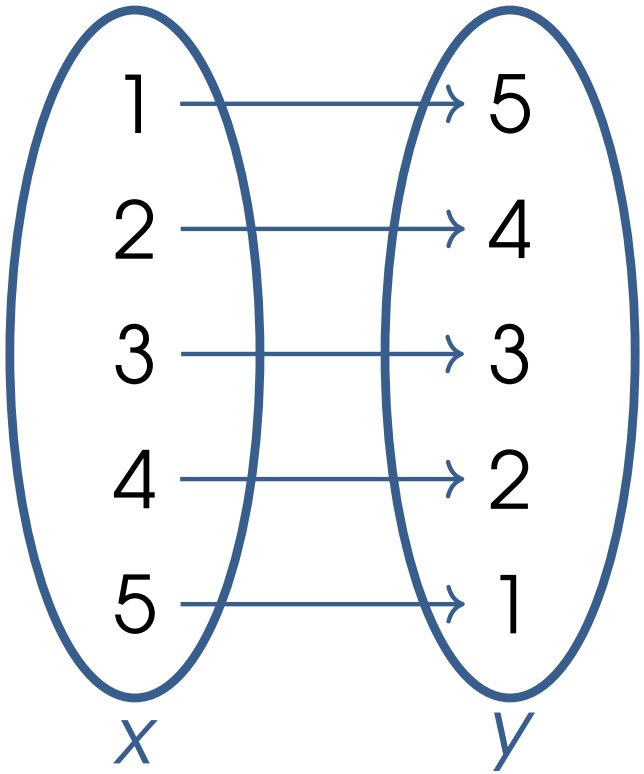
Example 6

Find the domain and range of the relation represented in this mapping diagram.



Example 6

Find the domain and range of the relation represented in this mapping diagram.



Domain $= \{1, 2, 3, 4, 5\}$

Example 6

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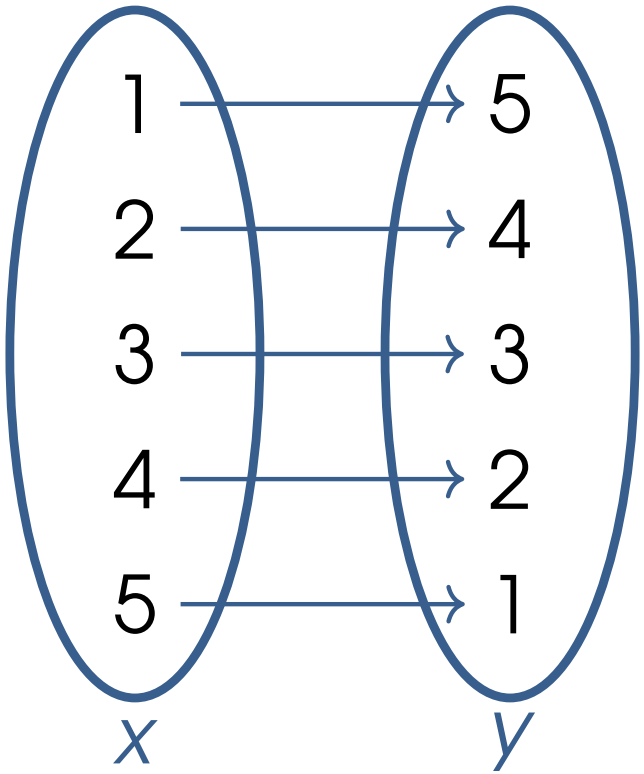
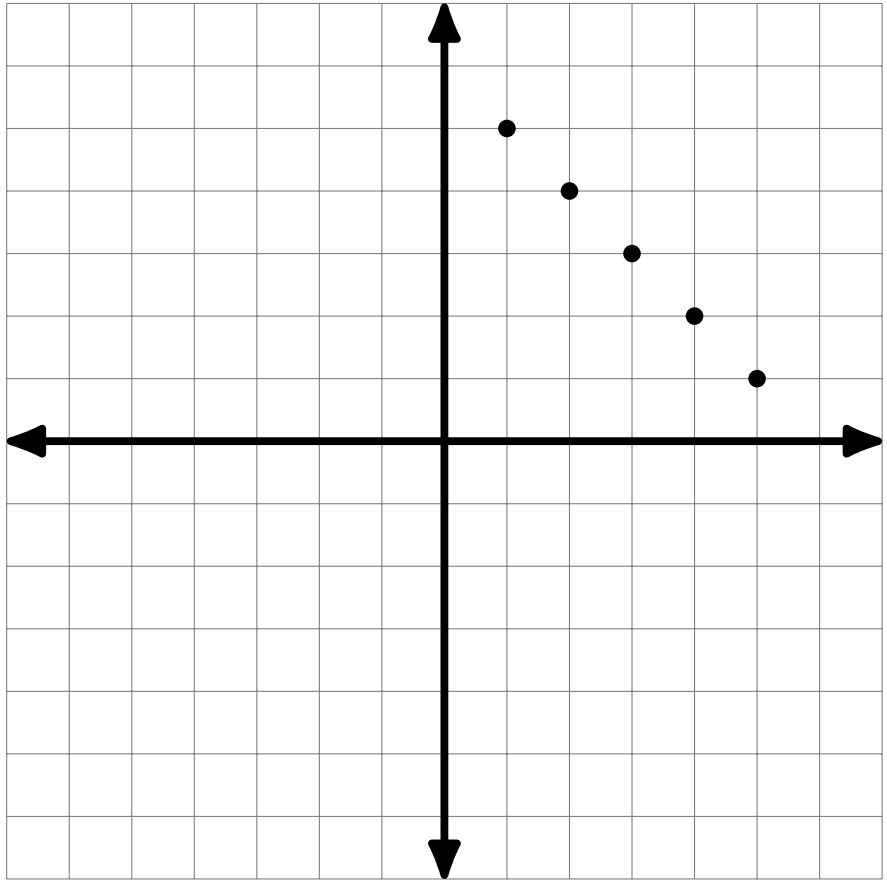


Domain $= \{1, 2, 3, 4, 5\}$
Range $= \{5, 4, 3, 2, 1\}$

Example 7

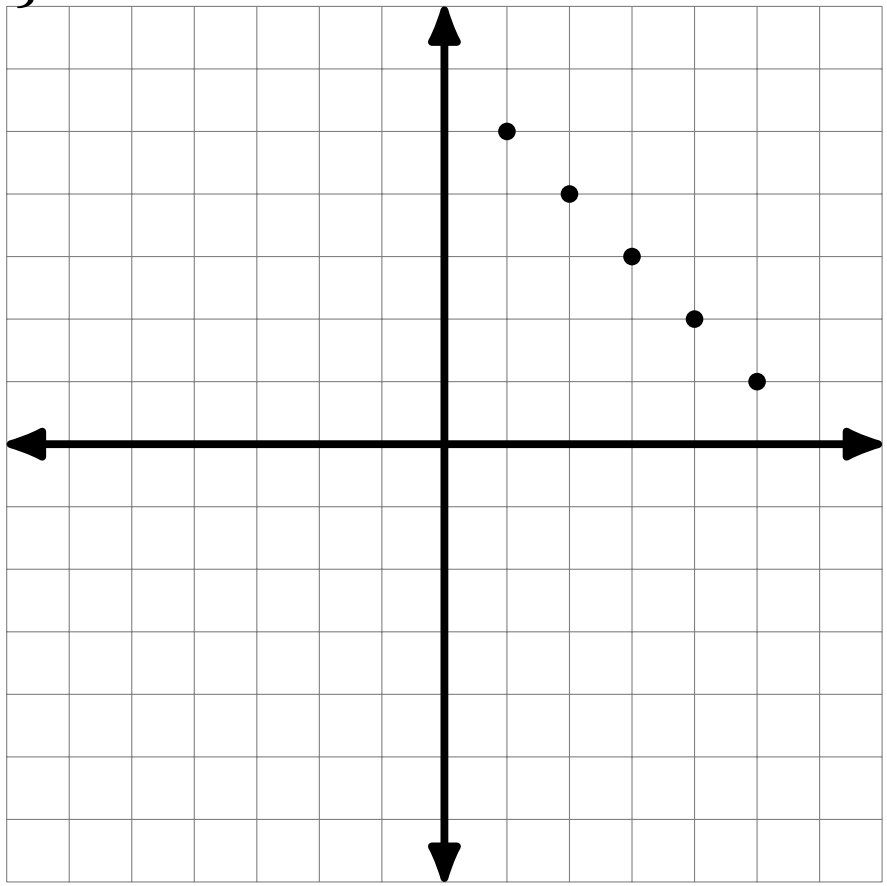
Find the domain and range of the relation represented in this graph.



Example 7

Find the domain and range of the relation represented in this graph.

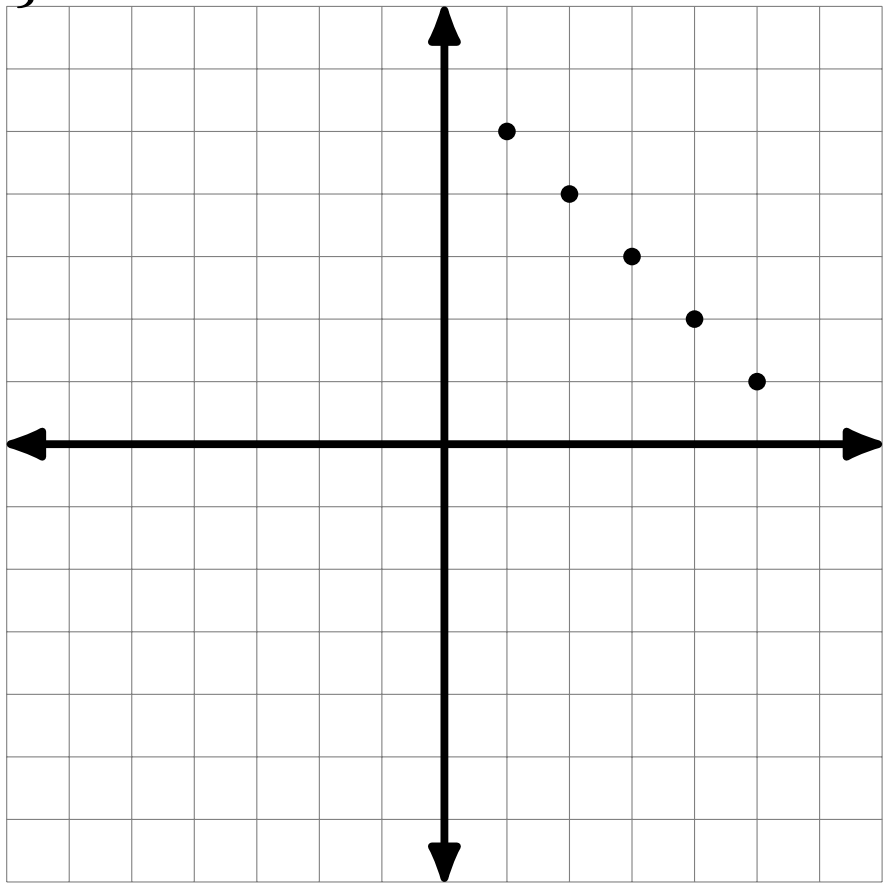
Domain $= \{1, 2, 3, 4, 5\}$



Example 7

Find the domain and range of the relation represented in this graph.

Domain $= \{1, 2, 3, 4, 5\}$
Range $= \{5, 4, 3, 2, 1\}$



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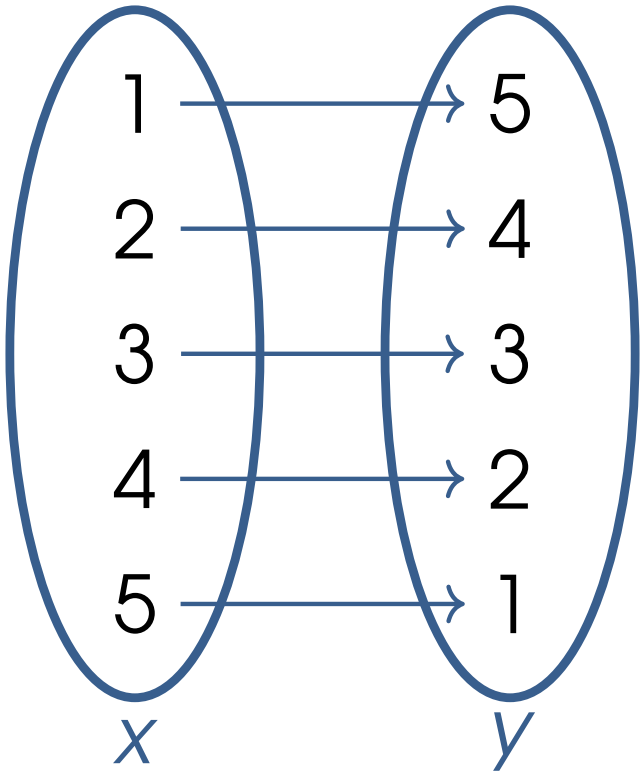
3. One-to-many Correspondence: One element of the first set is paired with different elements in the second set.

What are the Kinds of Relations?



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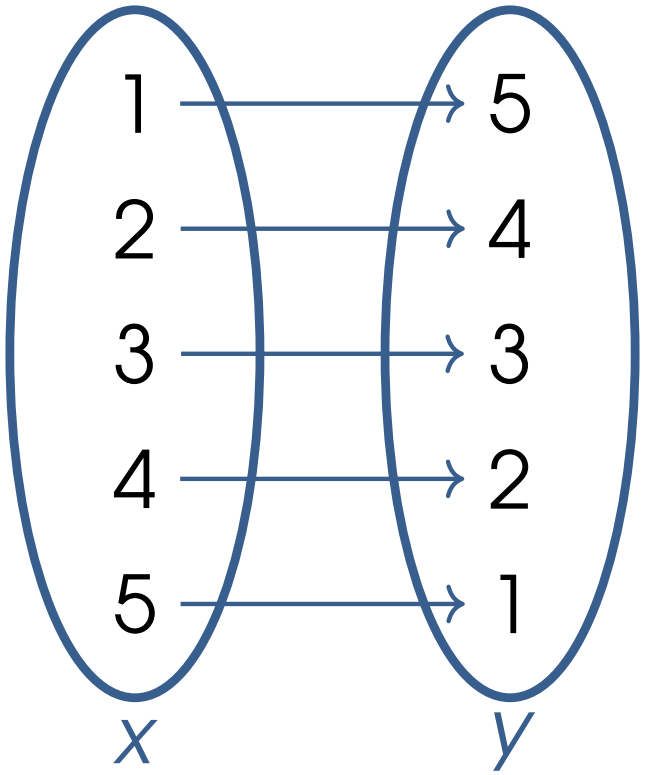

One-to-one Correspondence

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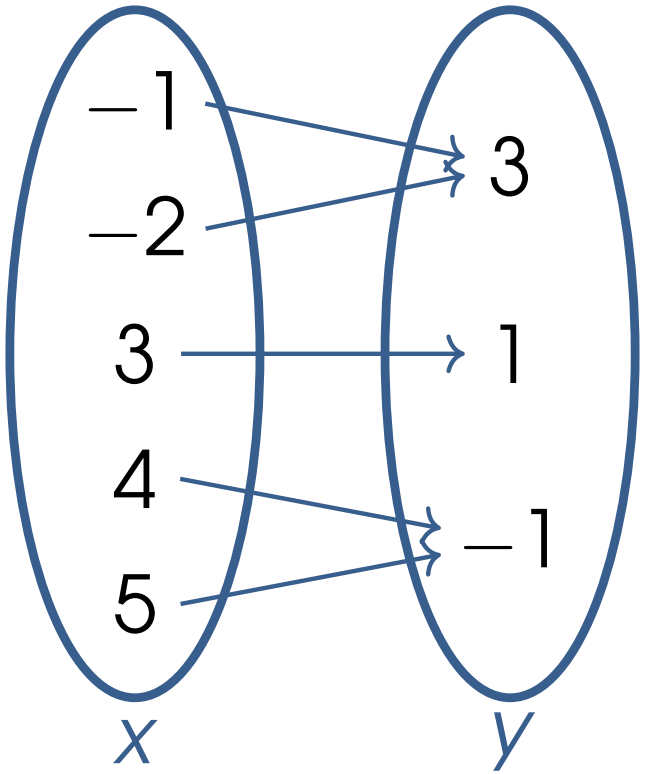

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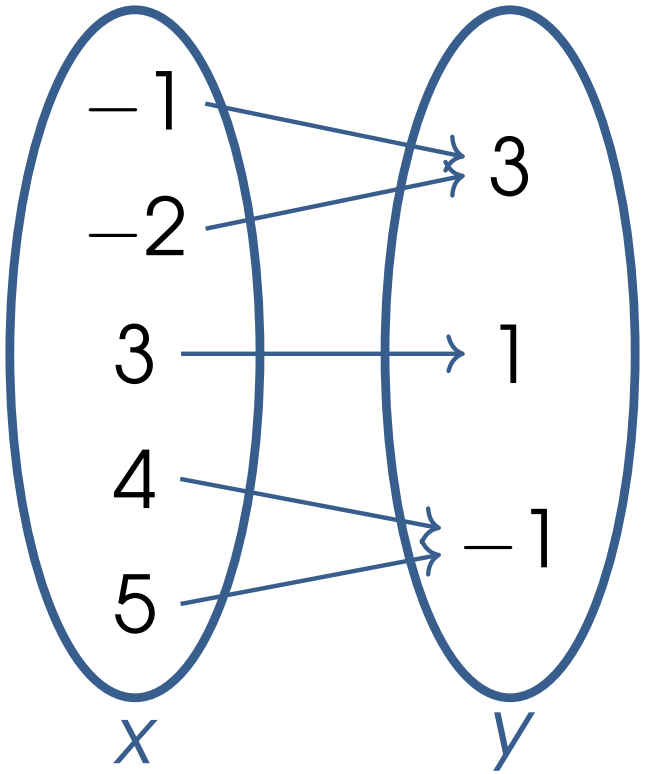

Many-to-one Correspondence

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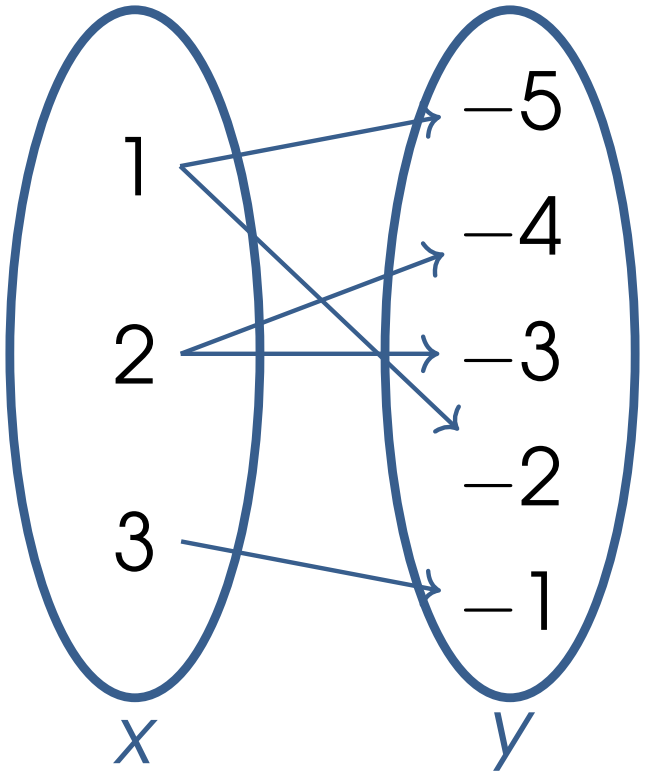

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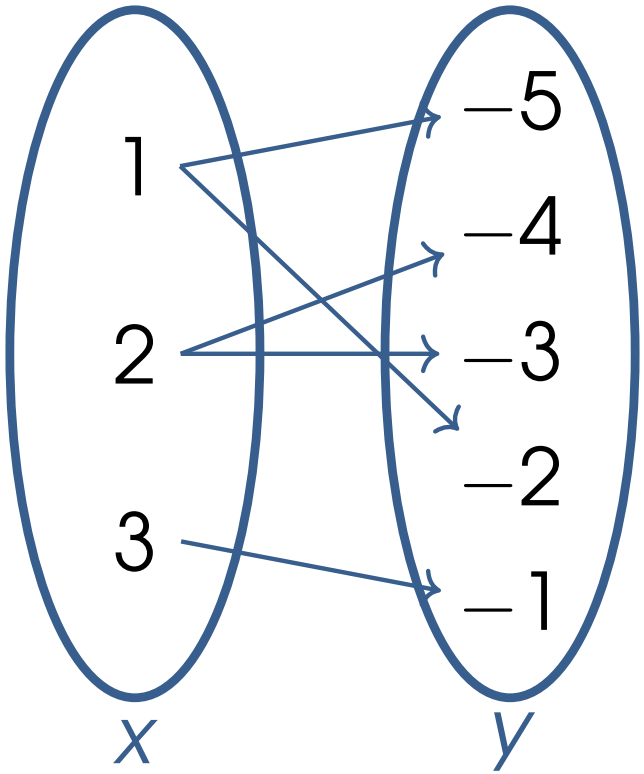

One-to-many Correspondence

Example 8

What type of correspondence is shown in the relation described by this set of ordered pairs?

$$\{(1, 40), (2, 80), (3, 120), (4, 160), (5, 200)\}$$

.

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One-to-one Correspondence

Example 9

What type of correspondence is shown in the relation described by this table?

x	-2	-1	0	1	2
y	-2	-2	0	2	2

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What type of correspondence is shown in the relation described by this table?

x	-2	-1	0	1	2
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Many-to-one Correspondence

Example 10

What type of correspondence is shown in the relation described by this table?

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

Example 10

What type of correspondence is shown in the relation described by this table?

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

One-to-many Correspondence

Thank you for watching.