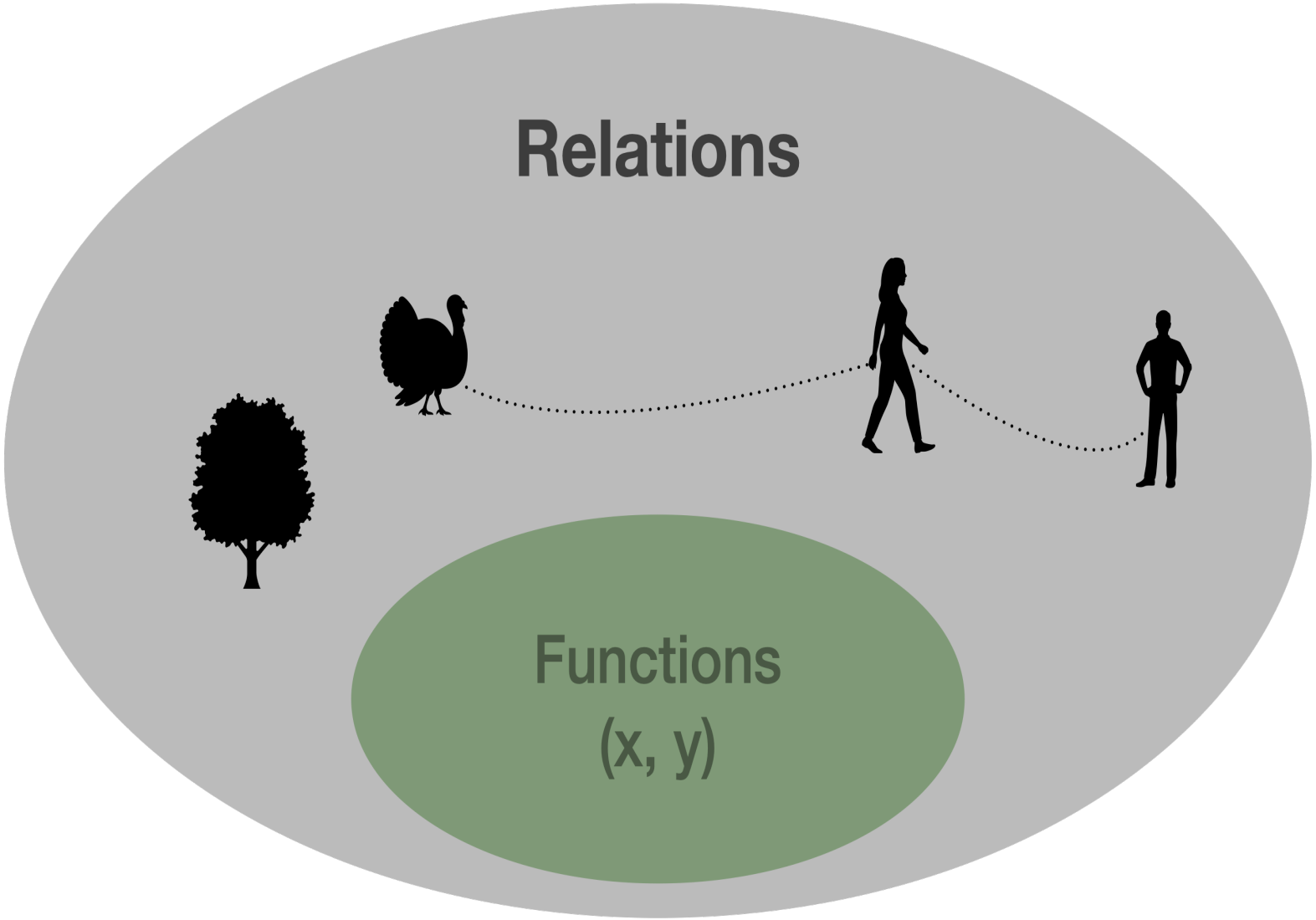
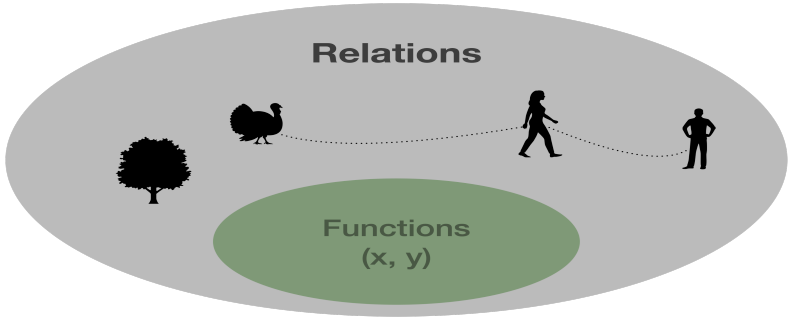
Relations vs Functions

Relations vs Functions



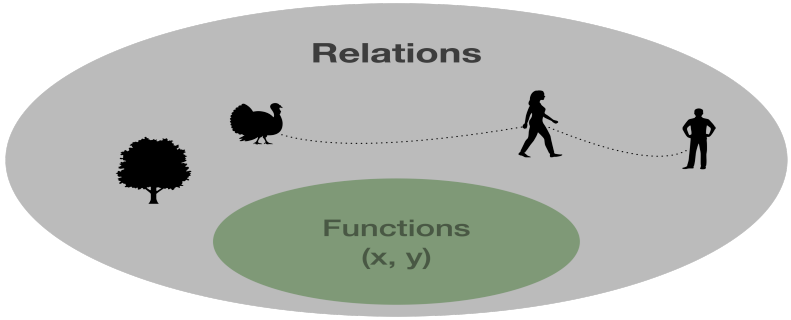
Binary relations



Relations

Left totality, right totality, left unique, right unique.

Binary relations



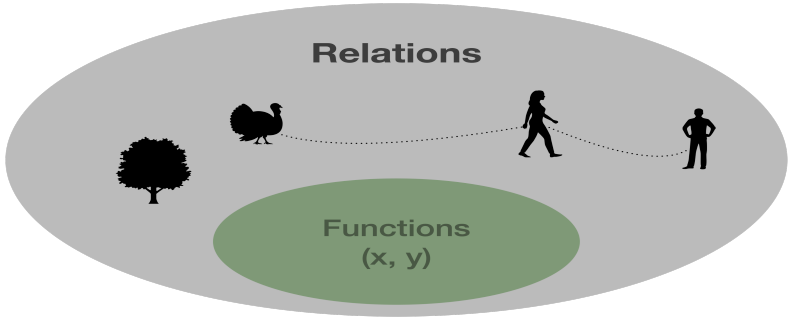
Relations

Left totality, right totality, left unique, right unique.

Functions

Partial function, (total) function, injective function ($\wedge$ left-unique), surjective function ($\wedge$ right-total), bijection (function + left-unique $\wedge$ right-total)

Binary relations



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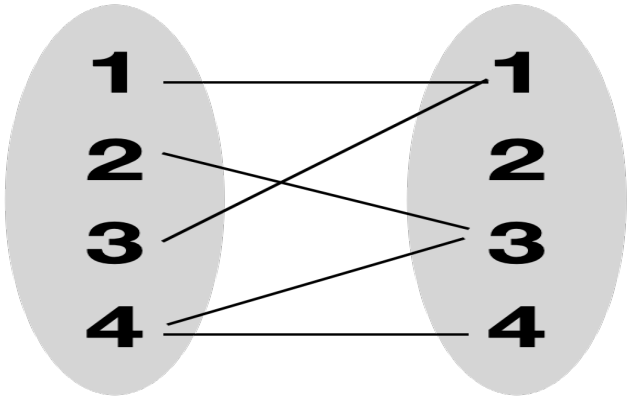
Equivalence Closures

Reflexive, Symmetric, Transitive.

What kind of relations?



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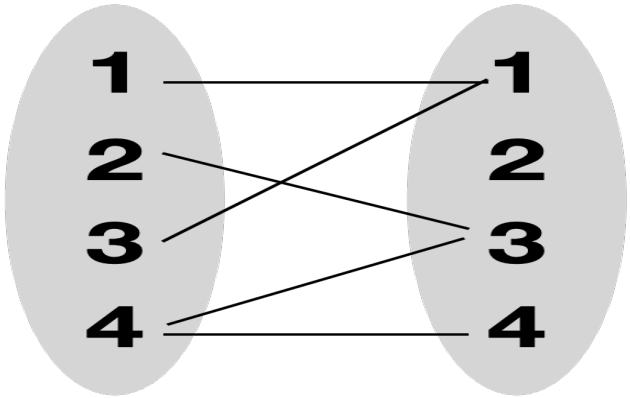

Left Total

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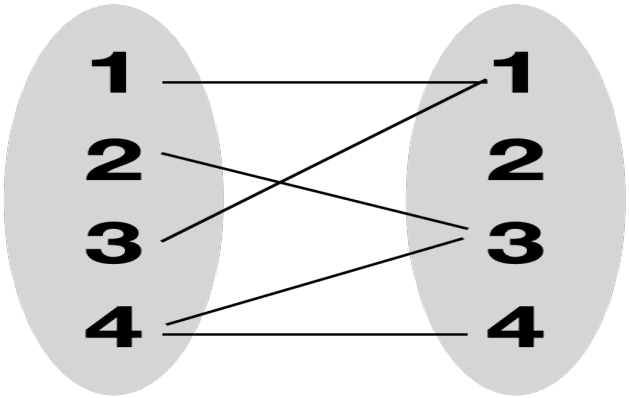

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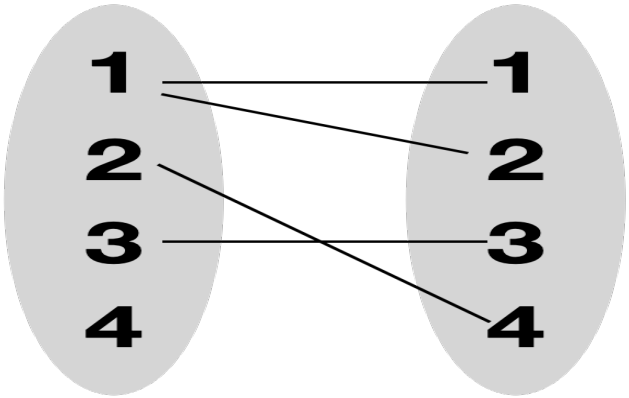

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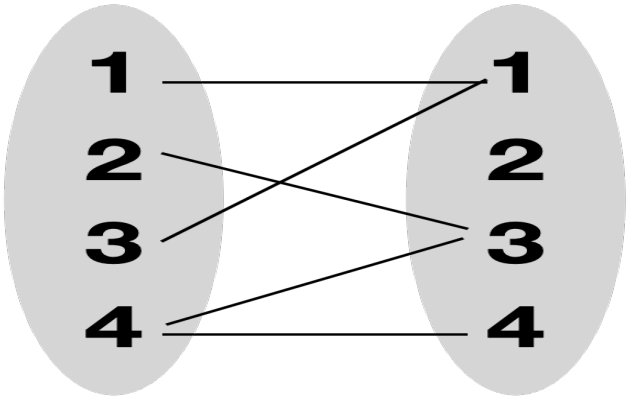

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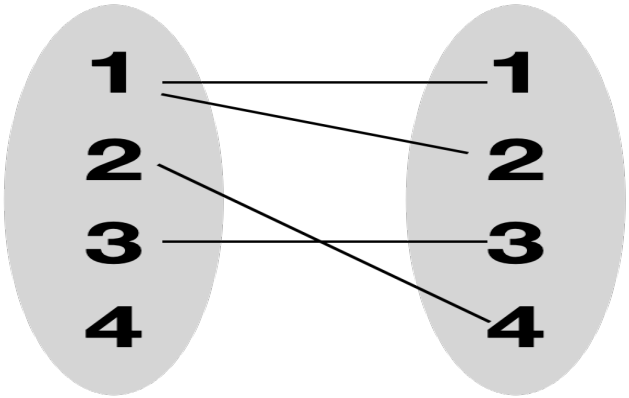

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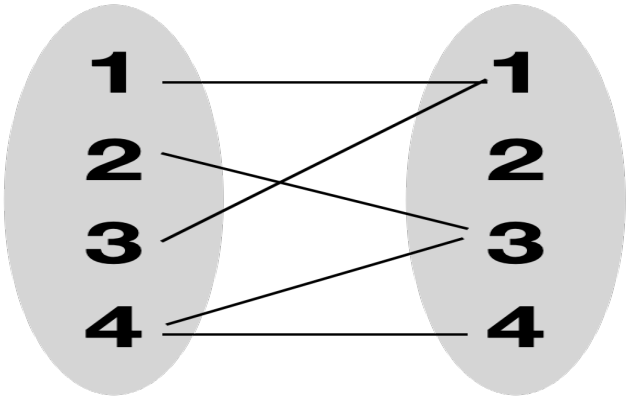

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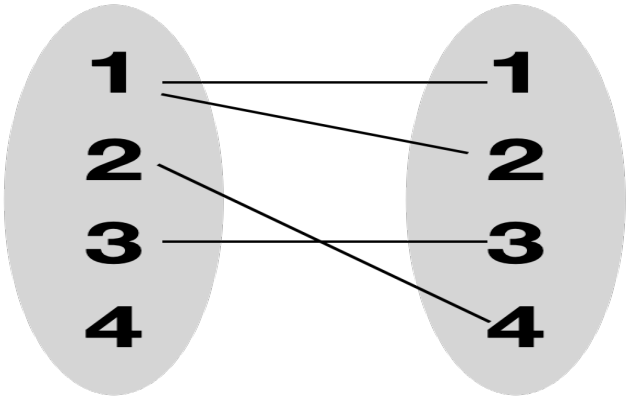

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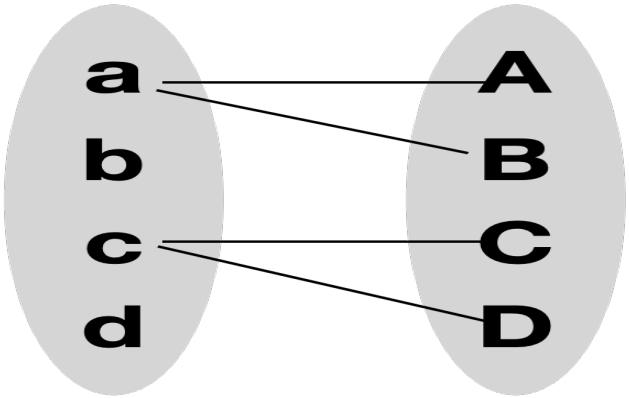

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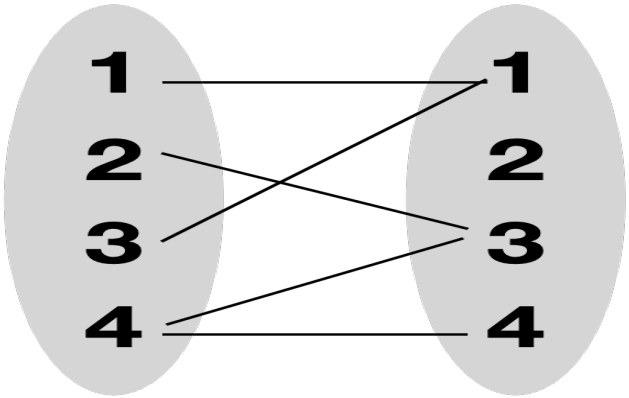

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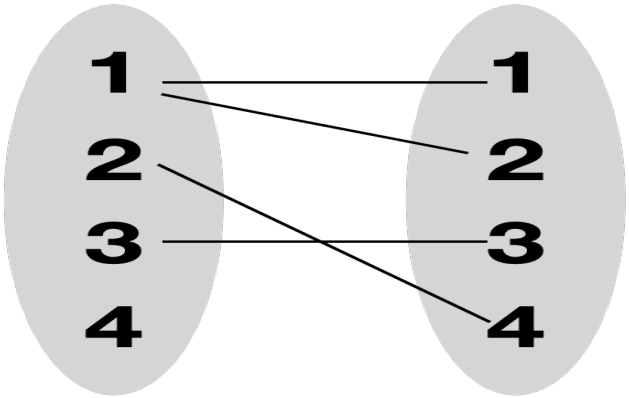

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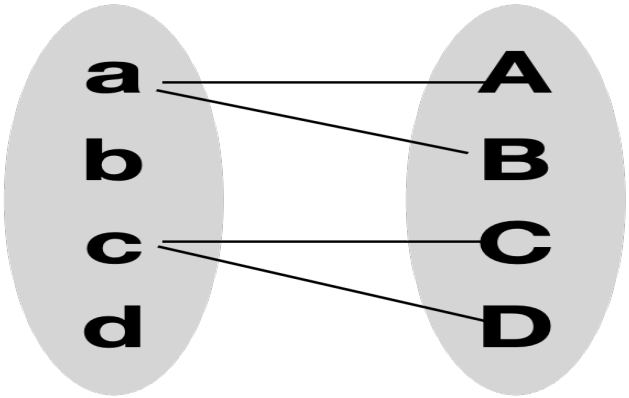

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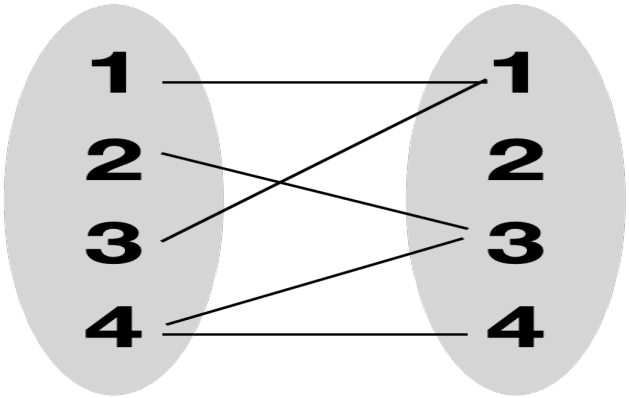

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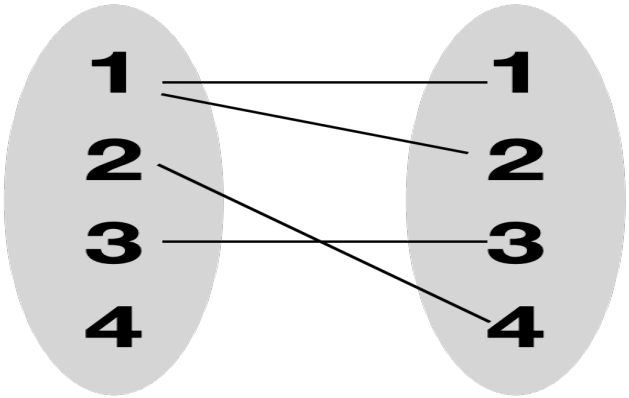

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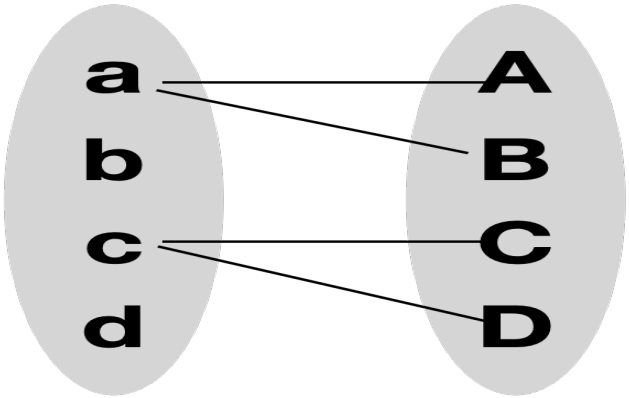

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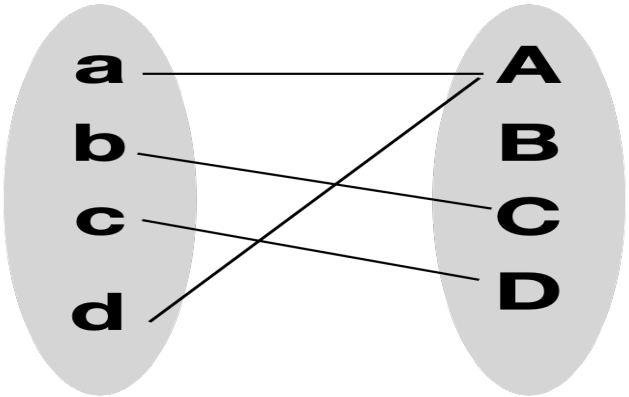

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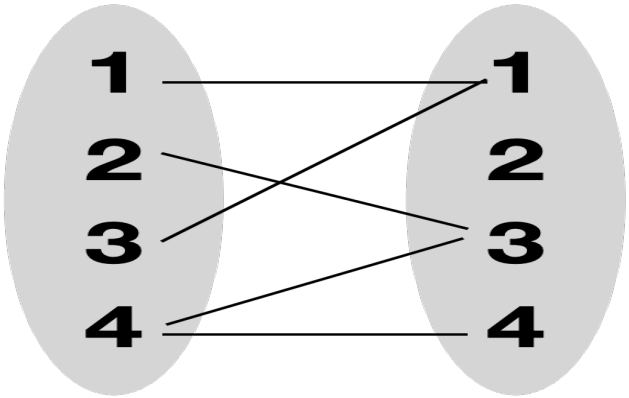

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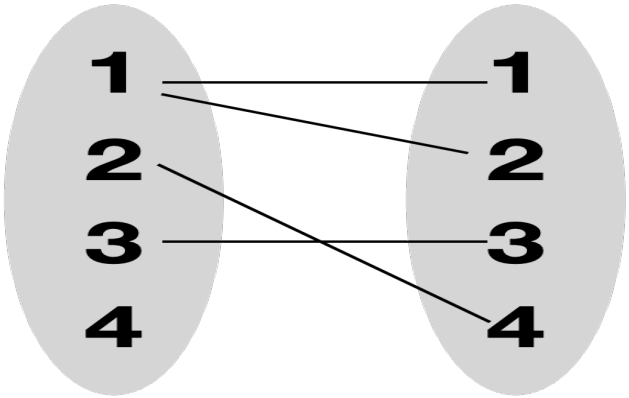

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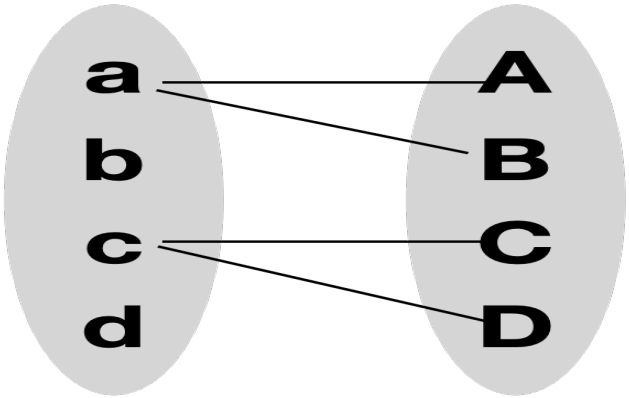

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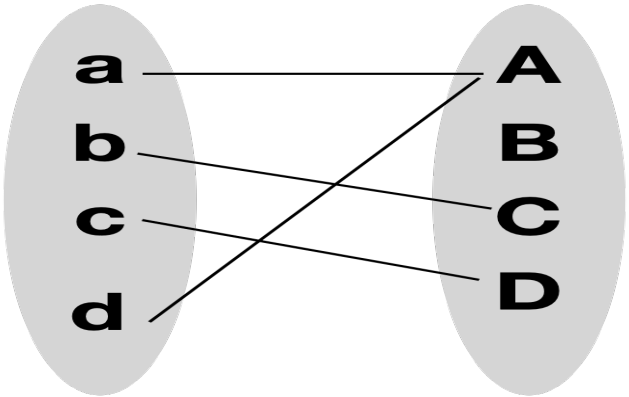
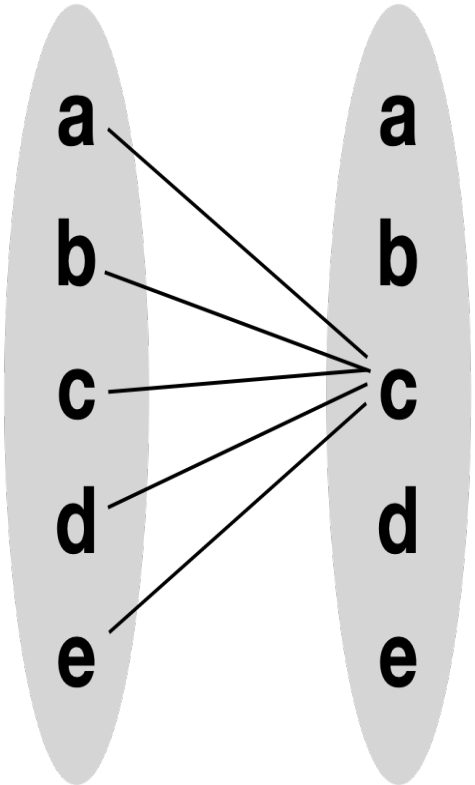


Right Unique

Exercise - Definitions



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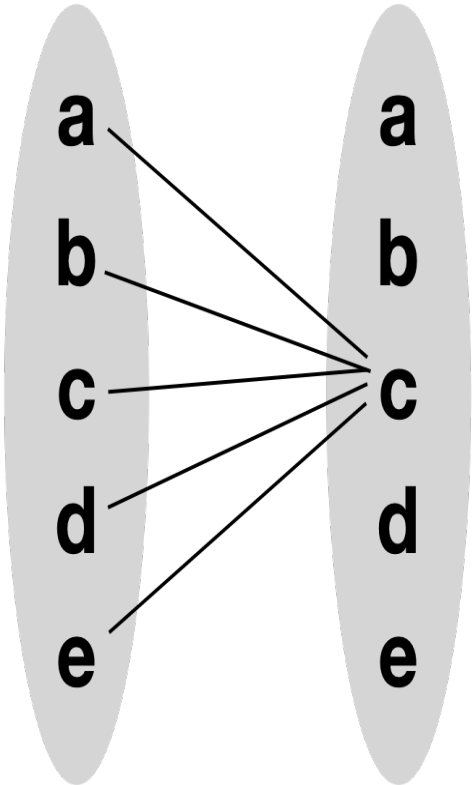

Yes

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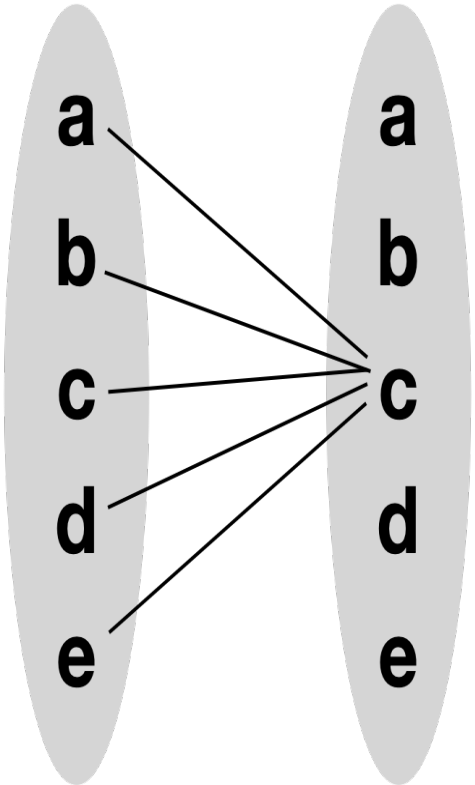
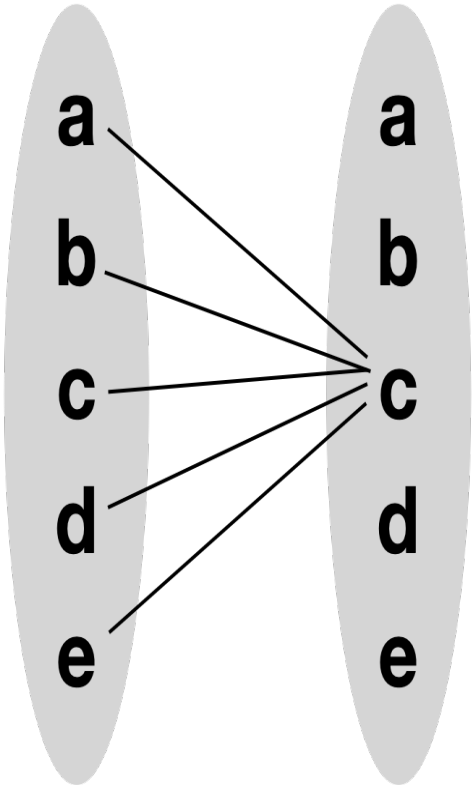


Yes

- Left-total
- Right unique
- Function

Exercise - Definitions



Yes

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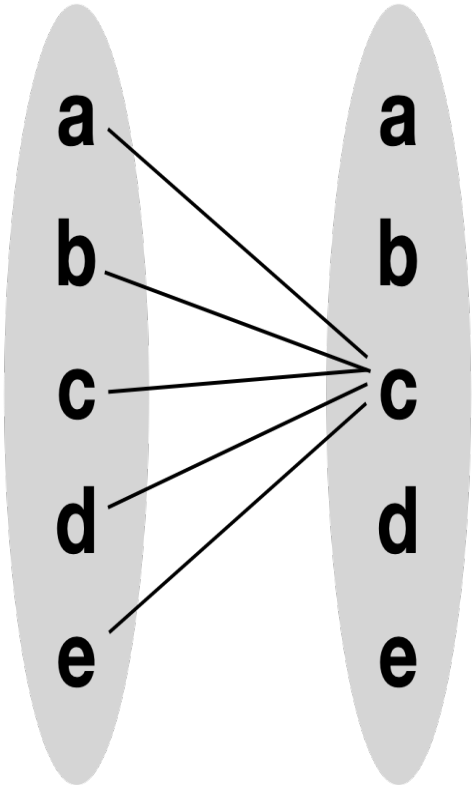
- Right unique
- Function

No

Exercise - Definitions



Yes

- Left-total
- Right unique
- Function

No

- Right-total
- Left-unique
- Partial function
- Injective function
- Surjective function
- Bijection

Exercise - Closure

Compute equivalence closure of R over $\mathcal{U} = \{a, b, c, d, e, f\}$

$R = \{(a, b), (c, e), (d, b), (f, e)\}$

- Reflexive closure: $S_1 = \{(a, a), (b, b), (c, c), (d, d), (e, e), (f, f)\}$
- Symmetric closure: $S_2 = \{(b, a), (e, c), (b, d), (e, f)\}$
- Transitive closure: $S_3 = \{(a, d), (c, f), (d, a), (f, c)\}$

$R = R \cup S_1 \cup S_2 \cup S3$

Q & A