

Set Relation Language

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0.1 Notation

- $A = \{1, 2, 3\}$
- $\{x \mid x = 1 \text{ or } x = 2 \text{ or } x = 3\}$
- $\{x \mid P(x)\}$ (where P is a predicate)

0.2 Tests

Results in a boolean value.

- `x memberOf A`
- `x containedIn A`
- `x includedIn A`
- `x elementOf A`, `x in A`, `x eo A`
- `A contains x`
- `A includes x`, `A has x`
- `A subsetOf B`, `A <= B`
- `A properSubsetOf B`, `A < B`
- `B supersetOf A`, `B >= A`
- `B properSupersetOf A`, `B > A`

0.3 Queries

- `cardinality(A)`, `card(A)`, `|A| -> int` (set is seen as a collection of elements)
- `subsetCardinality(A)`, `sscard(A) -> int` (set is seen as a collection of elements AND sets)

0.4 Operations/Transformations

Results in a Set.

- `A union B`, `union(A, B)`, `A + B`, `A | B`, `A u B`
- `A intersection B`, `intersection(A, B)`, `A & B`, `A i B`
- `A difference B`, `difference(A, B)`, `A - B`, `A \ B`, `A d B`
- `A symmetricDifference B`, `symmetricDifference(A, B)`, `A xor B`, `A ^ B`, `A sd B`
- `A cartesianProduct B`, `cartesianProduct(A, B)`, `A cartesian B`, `A x B`, `A * B`, `A cp B`
- `power A`, `power(A)`, `p A`, `A**`, `A^`, `A^n`

0.5 Tests on relations

Results in a boolean value.

Consider f a function that maps items from set A to set B .

- `surjective(f)`, `sur(f)`
- `injective(f)`, `inj(f)`

- `bijection(f)`, `bij(f)`

0.6 Uncategorized

- Partial function
- Total function
- Reflexive
- Symmetric
- Antisymmetric
- Transitive
- Surjective
- Injective
- Bijective
- Composition
 - Cartesian product
- Membership
- Identity
- Domain
- Range
- Union - Field
- Inverse
- Image
- Preimage

0.7 Ideas

- x Relation y
 - Tom isA human
 - Tom knows programming
 - Tom knows agi? (how do we determine the NOT operation based on relations alone? if there's no relation, then it implies the NOT operator)

1 References

- https://en.wikibooks.org/wiki/Set_Theory/Relations
- https://en.wikibooks.org/wiki/Set_Theory/Sets
- https://en.wikipedia.org/wiki/Set_theory
- https://en.wikipedia.org/wiki/Set-builder_notation