Glossary of Z notation

Based on appendix A in The Way of Z.

Names

a,b	**identifiers**
d,e	**declarations (e.g.,** a: A; b, ...: B ...**)**
f,g	**functions**
m,n	**numbers**
p,q	**predicates**
s,t	**sequences**
x,y	**expressions**
A,B	**sets**
C,D	**bags**
Q,R	**relations**
S,T	**schemas**
X	**schema text (e.g.,** d**,** d | p**, or** S**)**

Logic

true	**Logical true constant**
false	**Logical false constant**
¬p	**Logical negation, *not***
P ∧ q	**Logical conjunction, *and***
P ∨ q	**Logical disjunction, *or***
P ⇒ q	**Logical implication**
P ⇔ q	**Logical equivalence**
∀X • q	**Universal quantification**
∃X • q	**Existential quantification**
(**let** a == x; ... • p)	**Local definition**

Relations

A ↔ B	**Binary relation (**ℙ (A × B)**)**
A ↦ b	**Maplet (**(a,b)**)**
Dom R	**Domain of a relation**
ran R	**Range of a relation**
Q ⨾ R	**Forward relational composition**
Q ∘ R	**Backward relational composition (**R ⨾ Q**)**
A ◁ R	**Domain restriction**
A⩤R	**Domain anti-restriction**
A ▷R	**Range restriction**
A ⩥R	**Range anti-restriction**
R (| A |)	**Relational image**
R ~	**Inverse of relation**
R +	**Transitive closure**
Q ⊕ R	**Relational overriding**

Definitions

a == x	**Abbreviation definition**
a ::= b | ...	**Free type definition**
[a]	**Introduction of a given set (or** [a,...]**)**
a _	**Prefix operator**
_ a	**Postfix operator**
_ a _	**Infix operator**

Sets and expressions

x = y	**Equality**
x ≠y	**Inequality**
x ∈ A	**Set membership**
x ∉A	**Non-membership**
∅	**Empty set**
A ⊆ B	**Set inclusion**
A ⊂ B	**Strict set inclusion**
{ x, y, ... }	**Set display**
{ X • x }	**Set comprehension**
(λ X • x)	**Lambda expression**
(**let** a == x; ... •y)	**Local definition**
if p **then** x **else** y	**Conditional expression**
(x,y, ...)	**Tuple**
(x,y)	**Pair**
A × B ×...	**Cartesian product**
ℙA	**Power set**
A ∩ B	**Set intersection**
A ∪ B	**Set union**
A \ B	**Set difference**
first x	**First element of an ordered pair**
second x	**Second element of an ordered pair**
# A	**Number of elements in a set**

Functions

A ⇸B	**Partial functions**
A →B	**Total functions**
A ⤔B	**Partial injections**
A ↣B	**Total injections**
A ⤖ B	**Bijections**
f x	**Function application (or** f(x)**)**

Numbers

$\mathbb{Z}$	**Set of integers**
$\mathbb{N}$	**Set of natural numbers** { 0, 1, 2, ... }
$\mathbb{N}_1$	**Set of strictly positive numbers** { 1, 2, ... }
m+n	**Addition**
m-n	**Subtraction**
m*n	**Multiplication**
m **div** n	**Division**
m **mod** n	**Remainder (modulus)**
m ≤n	**Less than or equal**
m < n	**Less than**
m ≥ n	**Greater than or equal**
m > n	**Greater than**
m .. n	**Number range**
min A	**Minimum of a set of numbers**
max A	**Maximum of a set of numbers**

Sequences

seq A	**Set of finite sequences**
seq_1 A	**Set of non-empty finite sequences**
iseq A	**Set of finite injective sequences**
⟨⟩	**Empty sequence**
⟨x, y, ... ⟩	**Sequence display**
s ⌢ t	**Sequence concatenation**
head s	**First element of a sequence**
tail s	**All but the head element of a sequence**
Last s	**Last element of a sequence**
front s	**All but the last element of a sequence**
s **in** t	**Sequence segment relation**

Axiomatic definition

D

P

Schema

S

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d

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p

Generic Definition

[a,…]

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d

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p

Schema Calculus

S ≙ [X]	**Horizontal schema**
[T; ... | ...]	**Schema inclusion**
z.a	**Component selection (given** z:S**)**
θ S	**Binding**
¬S	**Schema negation**
S ∧ T	**Schema conjunction**
S ∨ T	**Schema disjunction**
S ⨾ T	**Schema composition**
S >> T	**Schema piping**

Conventions

A?	**Input to an operation**
A!	**Output from an operation**
A	**State component before an operation**
A'	**State component after an operation**
S	**State schema before an operation**
S'	**State schema after an operation**
ΔS	**Change of state**
ΞS	**No change of state**