Summary of Z Mathematical Notation

Basic expressions

Equality	$x = y$
Inequality	$x \neq y$
Conditional expression	**if** P **then** E_1 **else** E_2
Theta-expression	θS
Selection	$E.x$
Mu-expression	$(\mu x : T \mid P \bullet E)$
Let-expressions	(**let** $x == E1 \bullet E2$)

Sets

Membership	$x \in S$
Non-membership	$x \notin S$
Set display	$\{x_1, \cdots, x_n\}$
Set comprehension	$\{ x : T \mid P \bullet E \}$
Empty set	$\varnothing$
Subset relation	$S \subseteq T$
Proper subset relation	$S \subset T$
Power set	$\mathbb{P}\, S$
Non-empty subsets	$\mathbb{P}_1\, S$
Cartesian product	$S \times T$
Tuple	$(x_1, x_2, \cdots, x_n)$
First of pair	$\mathit{first}\, p$
Second of pair	$\mathit{second}\, p$
Set union	$S \cup T$
Set intersection	$S \cap T$
Set difference	$S \setminus T$
Generalized union	$\bigcup A$
Generalized intersection	$\bigcap A$
Finite sets	$\mathbb{F}\, X$
Non-empty finite sets	$\mathbb{F}_1\, X$

Relations

Binary relations	$X \leftrightarrow Y$
Maplet	$x \mapsto y$
Domain	$\mathrm{dom}\, R$
Range	$\mathrm{ran}\, R$
Identity relation	$\mathrm{id}\, X$
Composition	$Q \fatsemi R$
Backwards composition	$Q \circ R$
Domain restriction	$S \lhd R$
Range restriction	$R \rhd S$
Domain anti-restriction	$S \lhd\!\!\!- R$
Range anti-restriction	$R \rhd\!\!\!- S$
Relational inverse	$R^\sim$
Relational image	$R(\!\vert S \vert\!)$
Overriding	$Q \oplus R$
Iteration	R^k
Transitive closure	R^+
Reflexive trans. closure	R^*
Lambda-expresssions	$(\lambda x : T \mid P \bullet E)$
Partial functions	$X \pfun Y$
Total functions	$X \fun Y$
Partial injections	$X \pinj Y$
Total injections	$X \inj Y$
Partial surjections	$X \psurj Y$
Total surjections	$X \surj Y$
Bijections	$X \bij Y$
Finite partial functions	$X \ffun Y$
Finite partial injections	$X \finj Y$

Numbers and arithmetic

Natural numbers	$\mathbb{N}$
Integers	$\mathbb{Z}$
Strictly positive integers	$\mathbb{N}_1$
Arithmetic operators	$+ - * \mathsf{div}\ \mathsf{mod}$
Arithmetic comparisons	$< \leq \geq >$
Successor function	$succ$
Number range	$m \mathinner{..} n$
Size of a set	$\#S$
Minimum of a set	$min\, S$
Maximum of a set	$max\, S$

Sequences

Finite sequences	$\mathrm{seq}\, X$
Non-empty sequences	$\mathrm{seq}_1\, X$
Injective sequences	$\mathrm{iseq}\, X$
Sequence display	$\langle x_1, \cdots, x_n \rangle$
Concatentation	$s \frown t$
Reverse	$rev\, s$
Head of sequence	$head\, s$
Last element of sequence	$last\, s$
Tail of sequence	$tail\, s$
All but last element	$front\, s$
Extraction	$U \upharpoonright s$
Filtering	$s \upharpoonright V$
Compaction	$squash\, f$
Prefix relation	$s\ \mathsf{prefix}\ t$
Suffix relation	$s\ \mathsf{suffix}\ t$
Segment relation	$s\ \mathsf{in}\ t$
Distributed concatenation	$\frown / ss$
Disjointness	$\mathsf{disjoint}\ SS$
Partition relation	$SS\ \mathsf{partition}\ T$

Bags

Bags	$\mathrm{bag}\, X$
Bag display	$[\![x_1, \cdots, x_n]\!]$
Count of an element	$count\, B\, x$
Infix count operator	$B \sharp x$
Bag scaling	$n \otimes B$
Bag membership	$x \sqsubseteq B$
Sub-bag relation	$B \sqsubseteq C$
Bag union	$B \uplus C$
Bag difference	$B \uplus C$
Items in a sequence	$items\, s$