bunch

set

string

list

bunch	uncontained	unindexed
set		
string		
list		

bunch	uncontained	unindexed
set	contained	unindexed
string		
list		

bunch	uncontained	unindexed
set	contained	unindexed
string	uncontained	indexed
list		

bunch	uncontained	unindexed
set	contained	unindexed
string	uncontained	indexed
list	contained	indexed

Bunch Theory

Bunches can be used to represent collections.

Bunch Theory

Bunches can be used to represent collections.

$1, 3, 7$

Bunch Theory

Bunches can be used to represent collections.

$1, 3, 7$ $\top, \bot, 5,$ "a"

Bunch Theory

Bunches can be used to represent collections.

$1, 3, 7$ $\top, \bot, 5,$ "a" 2

Bunch Theory

Bunches can be used to represent collections.

$1, 3, 7$ $\top, \bot, 5, \text{“a”}$ 2

↑

Bunch Theory

Bunches can be used to represent collections.

$1, 3, 7$ $\top, \bot, 5,$ "a" 2

$\uparrow$

Bunch Theory

Bunches can be used to represent collections.

$1, 3, 7$ $\top, \bot, 5, \text{“a”}$ 2

↑

Bunch Theory

Bunches can be used to represent collections.

$1, 3, 7$ $\top, \bot, 5,$ "a" 2

Any number, character, binary, or set is an **elementary bunch**, or **element**.

Bunch Theory

Bunches can be used to represent collections.

$1, 3, 7$ $\top, \bot, 5,$ "a" 2

Any number, character, binary, or set is an **elementary bunch**, or **element**.

$A\ ,\ B$ union

Bunch Theory

Bunches can be used to represent collections.

$1, 3, 7$ $\top, \bot, 5, \text{“a”}$ 2

Any number, character, binary, or set is an **elementary bunch**, or **element**.

A , B	union
$A \text{ ‘ } B$	intersection

Bunch Theory

Bunches can be used to represent collections.

$1, 3, 7$ $\top, \bot, 5, \text{“a”}$ 2

Any number, character, binary, or set is an **elementary bunch**, or **element**.

A , B	union
$A \text{‘} B$	intersection
$A \mathbin{\overline{,}} B$	removal

Bunch Theory

Bunches can be used to represent collections.

$1, 3, 7$ $\top, \bot, 5, \text{"a"}$ 2

Any number, character, binary, or set is an **elementary bunch**, or **element**.

A , B	union
$A ‘ B$	intersection
$A \mathbin{\overline{,}} B$	removal
$¢A$	size, cardinality (number)

Bunch Theory

Bunches can be used to represent collections.

$1, 3, 7$ $\top, \bot, 5, “a”$ 2

Any number, character, binary, or set is an **elementary bunch**, or **element**.

A , B	union
$A ‘ B$	intersection
$A \mathbin{\overline{,}} B$	removal
$¢A$	size, cardinality (number)
$A: B$	inclusion (binary)

Bunch Theory

Bunch Theory

$$1, 3, 7 \quad = \quad 3, 1, 7, 1$$

Bunch Theory

$$1, 3, 7 \ = \ 3, 1, 7, 1$$

$$¢2 \ = \ 1$$

$$¢(1, 3, 7) \ = \ 3$$

Bunch Theory

$$1, 3, 7 \;=\; 3, 1, 7, 1$$

$$¢2 \;=\; 1$$

$$¢(1, 3, 7) \;=\; 3 \;=\; ¢(3, 1, 7, 1)$$

Bunch Theory

$$1, 3, 7 \;=\; 3, 1, 7, 1$$

$$¢2 \;=\; 1$$

$$¢(1, 3, 7) \;=\; 3 \;=\; ¢(3, 1, 7, 1)$$

$$2\!:\; 0, 2, 5, 9$$

Bunch Theory

$1, 3, 7 \;=\; 3, 1, 7, 1$

$¢2 \;=\; 1$

$¢(1, 3, 7) \;=\; 3 \;=\; ¢(3, 1, 7, 1)$

$2\!: \; 0, 2, 5, 9$

$2\!: \; 2$

Bunch Theory

$1, 3, 7 \;=\; 3, 1, 7, 1$

$¢2 \;=\; 1$

$¢(1, 3, 7) \;=\; 3 \;=\; ¢(3, 1, 7, 1)$

$2{:}\; 0, 2, 5, 9$

$2{:}\; 2$

$2, 9{:}\; 0, 2, 5, 9$

Bunch Theory

axioms

$x{:}\ y \quad = \quad x{=}y$	elementary axiom
$x{:}\ A{,}B \quad = \quad x{:}\ A \;\lor\; x{:}\ B$	union axiom
$x{:}\ A\text{‘}B \quad = \quad x{:}\ A \;\land\; x{:}\ B$	intersection axiom
$x{:}\ A \mathbin{\text{-}\!\!\!,} B \quad = \quad x{:}\ A \;\land\; \lnot\, x{:}\ B$	removal axiom
$A{,}A = A$	idempotence
$A{,}B = B{,}A$	symmetry
$A{,}(B{,}C) = (A{,}B){,}C$	associativity
$A\text{‘}A = A$	idempotence
$A\text{‘}B = B\text{‘}A$	symmetry
$A\text{‘}(B\text{‘}C) = (A\text{‘}B)\text{‘}C$	associativity
$A{,}B{:}\ C \quad = \quad A{:}\ C \;\land\; B{:}\ C$	antidistributivity
$A{:}\ B\text{‘}C \quad = \quad A{:}\ B \;\land\; A{:}\ C$	distributivity

Bunch Theory

axioms

→ x: y = x=y	elementary axiom
x: A,B = x: A ∨ x: B	union axiom
x: A‘B = x: A ∧ x: B	intersection axiom
x: $A \bar{,} B$ = x: A ∧ ¬ x: B	removal axiom
A,A = A	idempotence
A,B = B,A	symmetry
A,(B,C) = (A,B),C	associativity
A‘A = A	idempotence
A‘B = B‘A	symmetry
A‘(B‘C) = (A‘B)‘C	associativity
A,B: C = A: C ∧ B: C	antidistributivity
A: B‘C = A: B ∧ A: C	distributivity

Bunch Theory

axioms

$x{:}\ y \ = \ x{=}y$	elementary axiom
$x{:}\ A,B \ = \ x{:}\ A \lor x{:}\ B$	union axiom
$x{:}\ A`B \ = \ x{:}\ A \land x{:}\ B$	intersection axiom
$x{:}\ A \bar{,} B \ = \ x{:}\ A \land \neg\, x{:}\ B$	removal axiom
$A,A = A$	idempotence
$A,B = B,A$	symmetry
$A,(B,C) = (A,B),C$	associativity
$A`A = A$	idempotence
$A`B = B`A$	symmetry
$A`(B`C) = (A`B)`C$	associativity
$A,B{:}\ C \ = \ A{:}\ C \land B{:}\ C$	antidistributivity
$A{:}\ B`C \ = \ A{:}\ B \land A{:}\ C$	distributivity

Bunch Theory

axioms

	$x: y \;=\; x{=}y$	elementary axiom
	$x: A,B \;=\; x: A \;\vee\; x: B$	union axiom
	$x: A\text{‘}B \;=\; x: A \;\wedge\; x: B$	intersection axiom
	$x: A \overline{,} B \;=\; x: A \;\wedge\; \neg\, x: B$	removal axiom
→	$A,A = A$	idempotence
	$A,B = B,A$	symmetry
	$A,(B,C) = (A,B),C$	associativity
	$A\text{‘}A = A$	idempotence
	$A\text{‘}B = B\text{‘}A$	symmetry
	$A\text{‘}(B\text{‘}C) = (A\text{‘}B)\text{‘}C$	associativity
	$A,B: C \;=\; A: C \;\wedge\; B: C$	antidistributivity
	$A: B\text{‘}C \;=\; A: B \;\wedge\; A: C$	distributivity

Bunch Theory

axioms

$x: y \quad = \quad x{=}y$	elementary axiom
$x: A,B \quad = \quad x: A \;\lor\; x: B$	union axiom
$x: A‘B \quad = \quad x: A \;\land\; x: B$	intersection axiom
$x: A\overline{,}B \quad = \quad x: A \;\land\; \lnot\, x: B$	removal axiom
$A,A = A$	idempotence
→ $A,B = B,A$	symmetry
$A,(B,C) = (A,B),C$	associativity
$A‘A = A$	idempotence
$A‘B = B‘A$	symmetry
$A‘(B‘C) = (A‘B)‘C$	associativity
$A,B: C \quad = \quad A: C \;\land\; B: C$	antidistributivity
$A: B‘C \quad = \quad A: B \;\land\; A: C$	distributivity

Bunch Theory

axioms

$x: y \;=\; x=y$	elementary axiom
$x: A,B \;=\; x: A \;\vee\; x: B$	union axiom
$x: A`B \;=\; x: A \;\wedge\; x: B$	intersection axiom
$x: A\overline{,}B \;=\; x: A \;\wedge\; \neg\, x: B$	removal axiom
$A,A = A$	idempotence
$A,B = B,A$	symmetry
→ $A,(B,C) = (A,B),C$	associativity
$A`A = A$	idempotence
$A`B = B`A$	symmetry
$A`(B`C) = (A`B)`C$	associativity
$A,B: C \;=\; A: C \;\wedge\; B: C$	antidistributivity
$A: B`C \;=\; A: B \;\wedge\; A: C$	distributivity

Bunch Theory

axioms

Bunch Theory

axioms

$A: A,B$	generalization
$A`B: A$	specialization
$A: A$	reflexivity
$A: B \land B: A \ = \ A=B$	antisymmetry
$A: B \land B: C \ \Rightarrow \ A: C$	transitivity
$¢x \ = \ 1$	size
$¢(A,B) + ¢(A`B) \ = \ ¢A + ¢B$	size
$\neg\, x: A \ \Rightarrow \ ¢(A`x) = 0$	size
$A: B \ \Rightarrow \ ¢A \le ¢B$	size

Bunch Theory

axioms

	$A: A,B$	generalization
	$A‘B: A$	specialization
→	$A: A$	reflexivity
→	$A: B \ \wedge\ B: A \ = \ A=B$	antisymmetry
→	$A: B \ \wedge\ B: C \ \Rightarrow\ A: C$	transitivity
	$¢x \ = \ 1$	size
	$¢(A,B) + ¢(A‘B) \ = \ ¢A + ¢B$	size
	$\neg\ x: A \ \Rightarrow\ ¢(A‘x) = 0$	size
	$A: B \ \Rightarrow\ ¢A \le ¢B$	size

Bunch Theory

Bunch Theory

laws

$A,(A`B) = A$	absorption
$A`(A,B) = A$	absorption
$A: B \Rightarrow C,A: C,B$	monotonicity
$A: B \Rightarrow C`A: C`B$	monotonicity
$A: B = A,B = B = A = A`B$	inclusion
$A,(B,C) = (A,B),(A,C)$	distributivity
$A,(B`C) = (A,B)`(A,C)$	distributivity
$A`(B,C) = (A`B), (A`C)$	distributivity
$A`(B`C) = (A`B)`(A`C)$	distributivity
$A: B \wedge C: D \Rightarrow A,C: B,D$	conflation
$A: B \wedge C: D \Rightarrow A`C: B`D$	conflation

Bunch Theory

laws

	$A,(A`B) = A$	absorption
	$A`(A,B) = A$	absorption
$\longrightarrow$	$A: B \Rightarrow C,A: C,B$	monotonicity
$\longrightarrow$	$A: B \Rightarrow C`A: C`B$	monotonicity
	$A: B \;=\; A,B = B \;=\; A = A`B$	inclusion
	$A,(B,C) = (A,B),(A,C)$	distributivity
	$A,(B`C) = (A,B)`(A,C)$	distributivity
	$A`(B,C) = (A`B), (A`C)$	distributivity
	$A`(B`C) = (A`B)`(A`C)$	distributivity
	$A: B \wedge C: D \Rightarrow A,C: B,D$	conflation
	$A: B \wedge C: D \Rightarrow A`C: B`D$	conflation

Bunch Theory

Bunch Theory

null			the empty bunch
bin	=	$\top, \bot$	the binary values
nat	=	0, 1, 2, ...	the natural numbers
int	=	..., –2, –1, 0, 1, 2, ...	the integer numbers
rat	=	..., –1, 0, 2/3, ...	the rational numbers
real	=	..., $2^{1/2}$, ...	the real numbers
xnat	=	0, 1, 2, ..., ∞	the extended natural numbers
xint	=	–∞, ..., –2, –1, 0, 1, 2, ..., ∞	the extended integer numbers
xrat	=	–∞, ..., –1, 0, 2/3, ..., ∞	the extended rational numbers
xreal	=	–∞, ..., ∞	the extended real numbers
char	=	..., “a”, “A”, ...	the character values

Bunch Theory

→	*null*			the empty bunch
	bin	=	$\top, \bot$	the binary values
	nat	=	0, 1, 2, ...	the natural numbers
	int	=	..., –2, –1, 0, 1, 2, ...	the integer numbers
	rat	=	..., –1, 0, 2/3, ...	the rational numbers
	real	=	..., $2^{1/2}$, ...	the real numbers
	xnat	=	0, 1, 2, ..., ∞	the extended natural numbers
	xint	=	–∞, ..., –2, –1, 0, 1, 2, ..., ∞	the extended integer numbers
	xrat	=	–∞, ..., –1, 0, 2/3, ..., ∞	the extended rational numbers
	xreal	=	–∞, ..., ∞	the extended real numbers
	char	=	..., "a", "A", ...	the character values

Bunch Theory

null			the empty bunch
→ *bin*	=	$\top, \bot$	the binary values
nat	=	0, 1, 2, ...	the natural numbers
int	=	..., –2, –1, 0, 1, 2, ...	the integer numbers
rat	=	..., –1, 0, 2/3, ...	the rational numbers
real	=	..., $2^{1/2}$, ...	the real numbers
xnat	=	0, 1, 2, ..., ∞	the extended natural numbers
xint	=	–∞, ..., –2, –1, 0, 1, 2, ..., ∞	the extended integer numbers
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xreal	=	–∞, ..., ∞	the extended real numbers
char	=	..., “a”, “A”, ...	the character values

Bunch Theory

	null			the empty bunch
	bin	=	$\top , \bot$	the binary values
→	*nat*	=	0, 1, 2, ...	the natural numbers
	int	=	..., –2, –1, 0, 1, 2, ...	the integer numbers
	rat	=	..., –1, 0, 2/3, ...	the rational numbers
	real	=	..., $2^{1/2}$, ...	the real numbers
	xnat	=	0, 1, 2, ..., ∞	the extended natural numbers
	xint	=	–∞, ..., –2, –1, 0, 1, 2, ..., ∞	the extended integer numbers
	xrat	=	–∞, ..., –1, 0, 2/3, ..., ∞	the extended rational numbers
	xreal	=	–∞, ..., ∞	the extended real numbers
	char	=	..., “a”, “A”, ...	the character values

Bunch Theory

null			the empty bunch
bin	=	$\top, \bot$	the binary values
nat	=	0, 1, 2, ...	the natural numbers
→ *int*	=	..., –2, –1, 0, 1, 2, ...	the integer numbers
rat	=	..., –1, 0, 2/3, ...	the rational numbers
real	=	..., $2^{1/2}$, ...	the real numbers
xnat	=	0, 1, 2, ..., ∞	the extended natural numbers
xint	=	–∞, ..., –2, –1, 0, 1, 2, ..., ∞	the extended integer numbers
xrat	=	–∞, ..., –1, 0, 2/3, ..., ∞	the extended rational numbers
xreal	=	–∞, ..., ∞	the extended real numbers
char	=	..., "a", "A", ...	the character values

Bunch Theory

null			the empty bunch
bin	=	⊤ , ⊥	the binary values
nat	=	0, 1, 2, ...	the natural numbers
int	=	..., –2, –1, 0, 1, 2, ...	the integer numbers
→ *rat*	=	..., –1, 0, 2/3, ...	the rational numbers
real	=	..., $2^{1/2}$, ...	the real numbers
xnat	=	0, 1, 2, ..., ∞	the extended natural numbers
xint	=	–∞, ..., –2, –1, 0, 1, 2, ..., ∞	the extended integer numbers
xrat	=	–∞, ..., –1, 0, 2/3, ..., ∞	the extended rational numbers
xreal	=	–∞, ..., ∞	the extended real numbers
char	=	..., "a", "A", ...	the character values

Bunch Theory

null			the empty bunch
bin	=	$\top, \bot$	the binary values
nat	=	0, 1, 2, ...	the natural numbers
int	=	..., –2, –1, 0, 1, 2, ...	the integer numbers
rat	=	..., –1, 0, 2/3, ...	the rational numbers
→ *real*	=	..., $2^{1/2}$, ...	the real numbers
xnat	=	0, 1, 2, ..., ∞	the extended natural numbers
xint	=	–∞, ..., –2, –1, 0, 1, 2, ..., ∞	the extended integer numbers
xrat	=	–∞, ..., –1, 0, 2/3, ..., ∞	the extended rational numbers
xreal	=	–∞, ..., ∞	the extended real numbers
char	=	..., "a", "A", ...	the character values

Bunch Theory

	null			the empty bunch
	bin	=	$\top, \bot$	the binary values
	nat	=	0, 1, 2, ...	the natural numbers
	int	=	..., –2, –1, 0, 1, 2, ...	the integer numbers
	rat	=	..., –1, 0, 2/3, ...	the rational numbers
	real	=	..., $2^{1/2}$, ...	the real numbers
→	*xnat*	=	0, 1, 2, ..., ∞	the extended natural numbers
→	*xint*	=	–∞, ..., –2, –1, 0, 1, 2, ..., ∞	the extended integer numbers
→	*xrat*	=	–∞, ..., –1, 0, 2/3, ..., ∞	the extended rational numbers
→	*xreal*	=	–∞, ..., ∞	the extended real numbers
	char	=	..., “a”, “A”, ...	the character values

Bunch Theory

null			the empty bunch
bin	=	$\top, \bot$	the binary values
nat	=	0, 1, 2, ...	the natural numbers
int	=	..., –2, –1, 0, 1, 2, ...	the integer numbers
rat	=	..., –1, 0, 2/3, ...	the rational numbers
real	=	..., $2^{1/2}$, ...	the real numbers
xnat	=	0, 1, 2, ..., ∞	the extended natural numbers
xint	=	–∞, ..., –2, –1, 0, 1, 2, ..., ∞	the extended integer numbers
xrat	=	–∞, ..., –1, 0, 2/3, ..., ∞	the extended rational numbers
xreal	=	–∞, ..., ∞	the extended real numbers
→ *char*	=	..., "a", "A", ...	the character values

Bunch Theory

$x,..y$

Bunch Theory

$x,..y$ “ x to y ”

Bunch Theory

$x,..y$ "x to y" for $x \le y$

Bunch Theory

$x,..y$

Bunch Theory

$i: x,..y \quad = \quad x \le i < y$

Bunch Theory

$i\colon x,..y \quad = \quad x \le i < y$

$¢(x,..y) \quad = \quad y–x$

Bunch Theory

$i: x,..y \quad = \quad x \le i < y$

$¢(x,..y) \quad = \quad y{-}x$

$0,..3 \quad = \quad 0, 1, 2$

Bunch Theory

$i: x,..y \quad = \quad x \leq i < y$

$¢(x,..y) \quad = \quad y–x$

$0,..3 \quad = \quad 0, 1, 2$

$0,..2 \quad = \quad 0, 1$

Bunch Theory

$i: x,..y \quad = \quad x \le i < y$

$¢(x,..y) \quad = \quad y-x$

$0,..3 \quad = \quad 0, 1, 2$

$0,..2 \quad = \quad 0, 1$

$0,..1 \quad = \quad 0$

Bunch Theory

$i: x,..y$	$=$	$x \le i < y$
$¢(x,..y)$	$=$	$y–x$
$0,..3$	$=$	$0, 1, 2$
$0,..2$	$=$	$0, 1$
$0,..1$	$=$	0
$0,..0$	$=$	*null*

Bunch Theory

$i: x,..y$	$=$	$x \le i < y$
$¢(x,..y)$	$=$	$y-x$
$0,..3$	$=$	$0, 1, 2$
$0,..2$	$=$	$0, 1$
$0,..1$	$=$	0
$0,..0$	$=$	*null*
$0,..\infty$	$=$	*nat*

Bunch Theory

distribution

Bunch Theory

distribution

$$-(1, 3, 7) \ = \ -1, -3, -7$$

Bunch Theory

distribution

$$-(1, 3, 7) \;=\; -1, -3, -7$$

$$(1, 2) + (10, 20) \;=\; 11, 12, 21, 22$$

Bunch Theory

distribution

$$-(1, 3, 7) \;=\; -1, -3, -7$$

$$(1, 2) + (10, 20) \;=\; 11, 12, 21, 22$$

$$(1, 2) + 10 \;=\; 11, 12$$

Bunch Theory

distribution

$$-(1, 3, 7) \ = \ -1, -3, -7$$

$$(1, 2) + (10, 20) \ = \ 11, 12, 21, 22$$

$$(1, 2) + 10 \ = \ 11, 12$$

$$1 + 10 \ = \ 11$$

Bunch Theory

distribution

$-(1, 3, 7) = -1, -3, -7$

$(1, 2) + (10, 20) = 11, 12, 21, 22$

$(1, 2) + 10 = 11, 12$

$1 + 10 = 11$

$null + 10 =$

Bunch Theory

distribution

$$-(1, 3, 7) \;=\; -1, -3, -7$$

$$(1, 2) + (10, 20) \;=\; 11, 12, 21, 22$$

$$(1, 2) + 10 \;=\; 11, 12$$

$$1 + 10 \;=\; 11$$

$$null + 10 \;=\; null$$

Bunch Theory

distribution

$-(1, 3, 7) \;=\; -1, -3, -7$

$(1, 2) + (10, 20) \;=\; 11, 12, 21, 22$

$(1, 2) + 10 \;=\; 11, 12$

$1 + 10 \;=\; 11$

$null + 10 \;=\; null$

$nat + 2 \;=\; 2, 3, 4, 5, 6, ...$

Bunch Theory

distribution

$-(1, 3, 7) \;=\; -1, -3, -7$

$(1, 2) + (10, 20) \;=\; 11, 12, 21, 22$

$(1, 2) + 10 \;=\; 11, 12$

$1 + 10 \;=\; 11$

$null + 10 \;=\; null$

$nat + 2 \;=\; 2, 3, 4, 5, 6, ...$

$nat \times 2 \;=\; 0, 2, 4, 6, 8, ...$

Bunch Theory

distribution

$-(1, 3, 7) = -1, -3, -7$

$(1, 2) + (10, 20) = 11, 12, 21, 22$

$(1, 2) + 10 = 11, 12$

$1 + 10 = 11$

$null + 10 = null$

$nat + 2 = 2, 3, 4, 5, 6, ...$

$nat \times 2 = 0, 2, 4, 6, 8, ...$

$nat^2 = 0, 1, 4, 9, 16, ...$

Bunch Theory

distribution

$-(1, 3, 7) \;=\; -1, -3, -7$

$(1, 2) + (10, 20) \;=\; 11, 12, 21, 22$

$(1, 2) + 10 \;=\; 11, 12$

$1 + 10 \;=\; 11$

$null + 10 \;=\; null$

$nat + 2 \;=\; 2, 3, 4, 5, 6, ...$

$nat \times 2 \;=\; 0, 2, 4, 6, 8, ...$

$nat^2 \;=\; 0, 1, 4, 9, 16, ...$

$2^{nat} \;=\; 1, 2, 4, 8, 16, ...$

Set Theory

provides nested structure (things within things)

Set Theory

provides nested structure (things within things)

$\{A\}$	"set containing A"

Set Theory

provides nested structure (things within things)

$\{A\}$	"set containing A"
$\sim S$	"contents of S"

Set Theory

provides nested structure (things within things)

$\{A\}$	"set containing A"
$\sim S$	"contents of S"

$1, 3, 7$

Set Theory

provides nested structure (things within things)

$\{A\}$	"set containing A"
$\sim S$	"contents of S"

$\{1, 3, 7\}$

Set Theory

provides nested structure (things within things)

$\{A\}$	"set containing A"
$\sim S$	"contents of S"

$\{1, 3, 7\}, 8$

Set Theory

provides nested structure (things within things)

$\{A\}$	"set containing A"
$\sim S$	"contents of S"

$\{\{1, 3, 7\}, 8\}$

Set Theory

provides nested structure (things within things)

$\{A\}$	"set containing A"
$\sim S$	"contents of S"
$\{\{1, 3, 7\}, 8\}$	
$\{null\}$	the empty set

Set Theory

provides nested structure (things within things)

$\{A\}$	"set containing A"
$\sim S$	"contents of S"

$\{\{1, 3, 7\}, 8\}$	
$\{null\}$	the empty set
$\{nat\}$	the set of natural numbers

Set Theory

provides nested structure (things within things)

$\{A\}$	"set containing A"
$\sim S$	"contents of S"
$\{\{1, 3, 7\}, 8\}$	
$\{null\}$	the empty set
$\{nat\}$	the set of natural numbers
$\{0, 1, 2\} = \{0,..3\}$	

Set Theory

provides nested structure (things within things)

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$\lightning(0, 1) = \{null\}, \{0\}, \{1\}, \{0, 1\}$	power

Set Theory

axioms

$$\{\sim S\} = S$$

$$\sim\{A\} = A$$

$$\{A\} \mp A$$

$$\$\{A\} = ¢A$$

$$A \in \{B\} = A : B$$

$$\{A\} \subseteq \{B\} = A : B$$

$$\{A\} : ⚡B = A : B$$

$$\{A\} \cup \{B\} = \{A, B\}$$

$$\{A\} \cap \{B\} = \{A \text{ ‘ } B\}$$

$$\{A\} = \{B\} = A = B$$

Set Theory

axioms

$$\{\sim S\} = S$$

$$\sim\{A\} = A$$

→ $$\{A\} \mp A$$

$$\$\{A\} = ¢A$$

$$A \in \{B\} \;=\; A : B$$

$$\{A\} \subseteq \{B\} \;=\; A : B$$

$\{A\}:$ ↯$B \;=\; A : B$

$$\{A\} \cup \{B\} = \{A, B\}$$

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$$\{A\} = \{B\} \;=\; A = B$$

Set Theory

axioms

$\{\sim S\} \;=\; S$

$\sim\{A\} \;=\; A$

$\{A\} \;\mp\; A$

$\$\{A\} \;=\; ¢A$

$\longrightarrow$ $A \in \{B\} \;=\; A : B$

$\longrightarrow$ $\{A\} \subseteq \{B\} \;=\; A : B$

$\longrightarrow$ $\{A\} :\, ϟB \;=\; A : B$

$\{A\} \cup \{B\} \;=\; \{A, B\}$

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