Discrete

Logic

Symbol	Meaning	
$\sim p$	Not p	
$p \wedge q$	p and q	conjunction of p and q
$p \vee q$	p or q	disconjunction of p and q
$p \oplus q$ *or* p *XOR* q	p or q but not both p and q	exclusive or of p and q
$P \equiv Q$	P is logically equivalent to Q	
$p \rightarrow q$	Implication p implies q	If p then q
$p \leftrightarrow q$	p iff q ***(iff: if and only if)***	biconditional of p and q
$p \Leftrightarrow q$	Equivalence of p and q	
$P(x)$	Predicate in x	
$P(x) \Rightarrow Q(x)$	Every element in the truth set for $P(x)$ is in the truth set for $Q(x)$	
$P(x) \Leftrightarrow Q(x)$	$P(x)$ *and* $Q(x)$ have identical truth sets	
$\forall$	For all	
$\exists$	There exists	
$\exists!$	Uniqueness quantification	
$\boldsymbol{F}$	Contradiction	
$\boldsymbol{T}$	Tautology	
$\therefore$	therefore	
$p\{S\}q$	Partial correctness of S	

Number Theory

Symbol	Meaning
$a \mid b$	a divides b
$a \nmid b$	a does not divide b
a *div* b	Integer quotient of a divided by b
$\gcd(a,b)$	Greatest common divisor of a and b
$lcm(a,b)$	Least common multiply of a and b
$\lvert x \rvert$	Absolute value of x
$x \cong y$	x is approximately equal to y
a ***mod*** b	Integer remainder of a divided by b
$a \equiv b \pmod{m}$	a is congruent to b modulo m.
$a \not\equiv b \pmod{m}$	a is not congruent to b modulo m.
$(a_n a_{n-1} \cdots a_1 a_0)_b$	Base b representation

Set

Symbol	***Meaning***
$a \in A$	***a*** is an element of ***A***
$a \notin A$	***a*** is not an element of ***A***
$\{a_1, a_2, \cdots, a_n\}$	The set with elements $a_1, a_2, \cdots, a_n$
$\{x \in D \mid P(x)\}$	Sets of all x in D for which $P(x)$ is true
$\mathbb{R}$	All real numbers
$\mathbb{R}^+, \mathbb{R}^-, \mathbb{R}^{nonnegative}$	Positive / Negative / nonnegative real numbers
$\mathbb{Z}$	Sets of all integers
$\mathbb{Q}$	Rational numbers
$\mathbb{C}$	Complex numbers
$\mathbb{N}$	Natural numbers
$A \subset B$	A is a proper subset of B
$A \subseteq B$	A is a subset of B
$A \not\subseteq B$	A is not a subset of B
$A = B$	A equals B
$A \cup B$	A union B
$A \cap B$	A intersect B
$B - A$	Difference of B minus A
$A^c, \bar{A}$	Complement of A
(x, y)	Ordered pair
$(x_1, x_2, \cdots, x_n)$	Ordered n-tuple
$A \times B$	Cartesian product of A and B
$A_1 \times A_2 \times \cdots \times A_n$	Cartesian product of $A_1, A_2, \cdots, A_n$
$\varnothing$	Empty set or Null set
$\mathscr{P}(A)$	Power set of A
$(a, b), [a, b]$	Open, closed intervals
$\bigcup_{i=1}^{n} A_i$	Union of A_i, $i = 1, 2, \cdots, n$
$\bigcap_{i=1}^{n} A_i$	Intersection of A_i, $i = 1, 2, \cdots, n$
$A \ominus B \quad A \oplus B \quad A \Delta B$	Symmetric difference of A and B
$\aleph_0$	Cardinality of a countable set
$\mathfrak{c}$	Cardinality of $\mathbb{R}$

Sequences

Symbol	*Meaning*
$\ldots$	And so forth
$\sum_{k=m}^{n} a_k$	Summation from k equals m to n of a_k
$\prod_{k=m}^{n} a_k$	Product from k equals m to n of a_k
$n!$	n factorial

Counting and Probaility

Symbol	*Meaning*
$N(A)$	Number of element in set A
$P(E)$	Probability of a set E
$P(n,\ r)$	Number of r-permutation of a set of n elements
$P(E \mid F)$	Conditional probability of E given F
$C(n,\ r)$ $\binom{n}{r}$	n choose r, the number of r-combination of a set of n elements
$\binom{n}{r}$	Binomial coefficient n over r
$E(X)$	Expected value of the random variable X
$C(n;\ n_1, n_2, \ldots, n_m)$	Multinomial coefficient
$N(P_{i1} P_{i2} \ldots P_{in})$	Number of elements having properties $P_{ij},\ j = 1, \ldots, n$
$N(P'_{i1} \ldots P'_{in})$	Number of elements not having properties $P_{ij},\ j = 1, \ldots, n$
ϵ	Null string

Functions

Symbol	*Meaning*
$f : X \to Y$	f is a function from X *to* Y
$f(x)$	Value of f at x
$x \xrightarrow{f} y$	f sends x to y
$f(A)$	Image of A
$f^{-1}(x)$	Inverse of f
I_X	Identity function of X
b^x	b raised to the power x
$\log_b(x)$	Logarithm with base b of x
$f \circ g$	Composition of g and f
$f_1 + f_2$	Sum of the functions f_1 and f_2
$f_1 f_2$	Product of the functions f_1 and f_2
$\underline{f(S)}$	Image of the set S under f
$\lfloor x \rfloor$	Floor function of x
$\lceil x \rceil$	ceiling function of x
a_n	Term of $\{a_i\}$ with subscript n
$\sum_{a \in S} a_\alpha$	Sum of a_α over $\alpha \in S$
$\min(x, y)$	Minimum of x and y
$\max(x, y)$	Maximum of x and y
$\sim$	Approximately equal to

Relations

Symbol	*Meaning*
$x\ R\ y$	x is related to y by R
R^{-1}	Inverse relation of R
R^n	nth power of the relation R
R^*	connectivity relation R
$m \equiv n \pmod{d}$	m is congruent to n modulo d
$[a]$	Equivalence class of a
$[a]_R$	Equivalence class of a with respect to R
$[a]_m$	congruence class modulo m
Z_n	Set of equivalence classes of integers modulo n
$S \circ R$	Composite of the relation R and S
$J_P(R,S)$	Join
Δ	Diagonal relation
$x < y$	x is less than y
$x \leq y$	x is less than or equal to y
$x > y$	x is greater than y
$x \geq y$	x is greater than or equal to y

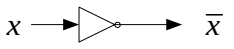
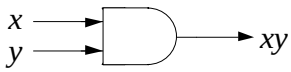
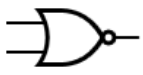
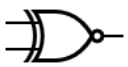
Graphs and Trees

Symbol	*Meaning*
$V(G)$	Set of vertices of a graph G
$E(G)$	Set of edges of a graph G
$G = (V,\ E)$	Graph with vertex set V and edge set E
$(v,\ w)$	Directed edge
$\{v,\ w\}$	(undirected) Edge joining v and w in a simple graph
K_n	Complete graph on n vertices
$K_{m,n}$	Complete bipartite graph on $(m,\ n)$ vertices
$\deg(v)$	Degree of vertex v
$v_0 e_1 v_1 e_2 \ldots e_n v_n$	Walk from v_0 to v_n
$G_1 \cup G_2$	Union of G_1 and G_2

Matrices

Symbol	*Meaning*
$\left[a_{ij}\right]$	Matrix with entries a_{ij}
$\boldsymbol{A}+\boldsymbol{B}$	Matrix sum of $\boldsymbol{A}$ and $\boldsymbol{B}$
$\boldsymbol{AB}$	Matrix product of $\boldsymbol{A}$ and $\boldsymbol{B}$
$\boldsymbol{I}_n$	Identity matrix of order n
$\boldsymbol{A}\vee\boldsymbol{B}$	Join of $\boldsymbol{A}$ and $\boldsymbol{B}$
$\boldsymbol{A}\wedge\boldsymbol{B}$	The meet of $\boldsymbol{A}$ and $\boldsymbol{B}$
$\boldsymbol{A}\odot\boldsymbol{B}$	Boolean product of $\boldsymbol{A}$ and $\boldsymbol{B}$
$\boldsymbol{A}^{[n]}$	nth Boolean power of $\boldsymbol{A}$

Boolean Algebra

Symbol	*Meaning*
B	$\{0, 1\}$
$\overline{x}$	Complement of the Boolean variable x
$x\cdot y$ $(or\ xy)$	Boolean product of x and y
$x+y$	Boolean sum of x and y
F^d	Dual of F
$x\mid y$	x *NAND* y
$x\downarrow y$	x NOR y
	inverter
	OR gate
	AND gate
	NOR $\overline{x+y}$
	NAND $\overline{x\cdot y}$
	XOR $x\oplus y$
	XNOR $\overline{x\oplus y}$ *or* $x\odot y$

Symbol	***Meaning***
xy	Concatenation of x and y
λ	Empty string
$l(x)$	Length of the string x
(V,T,S,P)	Phrase – structure grammar
$w \to w_1$	production
$w_1 \Rightarrow w_2$	w_2 is directly derivable from w_1