Notation Index

Introduction

\{ \cdots \} set of elements 3
\{ \cdots \mid \cdots \} set defined by property 3
\in is an element of 3
\not\in is not an element of 3
\subseteq is a subset of 3
\not\subseteq is not a subset of 3
\subset is a proper subset of 3
\not\subset is not a proper subset of 3
\cup union 3
\cap intersection 3
\setminus difference 3
\Delta symmetric difference 3
\max(A) maximum of A 3
\min(A) minimum of A 3
\times cartesian product 3
\langle \cdots \rangle tuple 3
A^k kth power of A 3
A^{\omega_1} set of finite sequences from A 3
x^k coordinate of x 3
S^{(k)} kth column of S 3
\emptyset empty set 3
N set of natural numbers 3
\oplus direct sum 3
\left| A \right| cardinality of A 3
\aleph_0, \aleph_1 cardinal numbers 3
2^{\aleph_0} cardinality of continuum 3
\varphi : A \rightarrow B function notation 3
\downarrow converges 3
\uparrow diverges 3
x \mapsto \varphi(x) x is mapped to \varphi(x) 3
\text{dom}(\varphi) domain of \varphi 3
\text{rng}(\varphi) range of \varphi 3
\chi_S characteristic function of S 3
\upharpoonright restriction 3
\text{lim}_{n \to \infty} limit 4
\text{lim sup}_{n \to \infty} limit supremum 4
\text{lim inf}_{n \to \infty} limit infimum 4
\lambda f(x, y) lambda notation 4
\leq extension for functions 4
2^S power set of S 4
[ \cdots ] interval notation 4
( \cdots ) interval notation 4
[ \cdots ) interval notation 4
\[ \ldots \] interval notation 4
\[ (a, \infty) \] interval notation 4
\[ (-\infty, a] \] interval notation 4
\& and 4
\lor or 4
\neg, \neg \neg not 4
\rightarrow, \Rightarrow implies 4
\leftrightarrow, \Leftrightarrow if and only if 4
\exists existential quantifier 4
\forall universal quantifier 4
\bigwedge_{i=0}^{\sigma_1} finite conjunction 4
\bigvee_{i=0}^{\sigma_1} finite disjunction 4

Chapter I

\[ \mu \] least number operator 7
\[ \mathcal{R} \] class of recursive functions 7
\[ \mathcal{P} \] class of partial recursive functions 9
\[ \mathcal{S} \] space of strings 10
\[ \mathcal{S}_f \] space of \( f \)-valued strings 10
\[ \mathcal{S}_c \] space of strings with values \( \leq c \) 10
\[ \mathcal{S}_b \] space of binary strings 10
\[ \leq \] extension for strings 10
\[ \text{len}(\sigma) \] length of string 10
\[ \sigma \star \tau \] concatenation of strings 10
\[ \mathcal{R}_f \] functions recursive in \( f \) 11
\[ \leq_{T} \] Turing reducibility 11
\[ \chi_{\mathcal{R}} \] characteristic function of relation 11
\[ \varphi \] enumeration function 12
\[ \phi^{(n)}_{\sigma}, \phi_{\sigma}, \phi^{(n)}_{\sigma} \] enumeration functionals 13

Chapter II

\[ f, A \] degree of \( f, A \) 15
\[ \equiv_{T} \] Turing equivalence 15
\[ D \] degrees of unsolvability 15
\[ \leq \] partial ordering on \( D \) 15
\[ \join \] join operation on \( D \) 15
\[ \mathcal{D} \] poset of degrees 15
\[ \mathcal{D}^{\leq} \] usl of degrees 15
\[ \emptyset \] degree of recursive functions 15
\[ \mathcal{U}(\mathcal{A}) \] lub of finite set of degrees 15
\[ \mathcal{R}(\mathcal{A}) \] glb of finite set of degrees 15
\[ \mathcal{A} \mathcal{B} \] incomparability for degrees 17
\[ p \prec q \] \( p \) refines \( q \) 19
\[ p \perp q \] incompatibility for forcing conditions 19
\[ |= \] satisfies 21
\[ \models \] forces 21
\[ \varepsilon_{\mathcal{A}} \] embedding 23
\[ \cong \] isomorphism 23
\[ \theta^{(n)} \] union of columns of \( \theta \) 24
\[ \theta^{(n)} \] union of all but one column of \( \theta \) 24
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## Chapter III

- $\Sigma^e_1, \Pi^e_1, \Delta^e_1$ levels of arithmetical hierarchy
- $f'$ completion of $f$
- $f^*$ jump of $f$
- $f^{\text{rec}}$ set recursively isomorphic to $f'$
- $f^{\text{th}}$ $n$th completion of $f$
- $f^{\text{th}}$ $n$th jump of $f$
- $D[a,b]$ interval notation for $D$
- $\mathcal{A}[a,b]$ interval notation for $\mathcal{A}$
- $J[0,0']$ range of jump operator on $D[0,0']$
- $\mathcal{A}^\text{th}$ poset of degrees with jump
- $a^*$ inverse of $a$
- $\mathcal{L}_n, H_n, I_n$ levels of high/low hierarchy

## Chapter IV

- high, low, $a$-high, $a$-low, classification in high/low hierarchy
- $\mathcal{L}_n(a), H_n(a), I_n(a)$ levels of relativized high/low hierarchy
- $\mathcal{G}_n, \mathcal{G}_n(a), \mathcal{G}_n(a)$ levels of generalized high/low hierarchy
- $\text{Tot}$ index set of total recursive functions
- $\text{Tot}(f)$ index set of total functions computable from $f$

## Chapter V–XII

- $\sigma, \tau$ incompatibility for strings
- $\text{Id}$ identity tree
- $\text{Ext}$ extension subtree
- $\text{Sp}$ splitting subtree
- $\text{Tot}$ $e$-total subtree
- $\text{Nar}$ narrow subtree
- $\text{Pt}$ pointed subtree
- $\mathcal{D}_{\text{arith}}$ arithmetical degrees
- $\equiv$ elementary equivalence
- $\equiv_j$ congruence for $n$-tuples
- $\equiv_u$ uniform subtree
- $\sigma^{(i)}$ $i$th coordinate of string of tuples
- $\text{tr}(\sigma \rightarrow \tau; \rho)$ transfer strings
- $\text{Diff}$ differentiating subtree
- $\text{Tr}$ transfer tree
- $\text{Exp}$ expansion tree
- $L_\mathcal{A}, L_\mathcal{A}_1, L_\mathcal{A}_2$ languages
- $\mathcal{N}$ second order arithmetic
- $D^+_2$ integers in model of second order arithmetic
- $\varphi^{\text{th}}$ iterate of jump operation
- $\text{PE}$ partial extension tree
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