

Appendix D

List of Symbols

| Symbol | Meaning | Page |
|-----------------------|------------------------------------|-------|
| \rightarrow | conditional statement | 5, 33 |
| \mathbb{R} | set of real numbers | 10 |
| \mathbb{Q} | set of rational numbers | 10 |
| \mathbb{Z} | set of integers | 10 |
| \mathbb{N} | set of natural numbers | 54 |
| $y \in A$ | y is an element of A | 55 |
| $z \notin A$ | z is not an element of A | 55 |
| $\{ \mid \}$ | set builder notation | 58 |
| \forall | universal quantifier | 63 |
| \exists | existential quantifier | 63 |
| \emptyset | the empty set | 60 |
| \wedge | conjunction | 33 |
| \vee | disjunction | 33 |
| \neg | negation | 33 |
| \leftrightarrow | biconditional statement | 39 |
| \equiv | logically equivalent | 43 |
| $m \mid n$ | m divides n | 82 |
| $a \equiv b \pmod{n}$ | a is congruent to b modulo n | 92 |
| $ x $ | absolute value of x | 135 |
| $A = B$ | A equals B (set equality) | 55 |
| $A \subseteq B$ | A is a subset of B | 55 |
| $A \not\subseteq B$ | A is not a subset of B | 219 |
| $A \subset B$ | A is a proper subset of B | 218 |

| Symbol | Meaning | Page |
|---|--|------|
| $\mathcal{P}(A)$ | power set of A | 222 |
| $ A $ | cardinality of a finite set A | 223 |
| $A \cap B$ | intersection of A and B | 216 |
| $A \cup B$ | union of A and B | 216 |
| A^c | complement of A | 216 |
| $A - B$ | set difference of A and B | 216 |
| $A \times B$ | Cartesian product of A and B | 256 |
| (a, b) | ordered pair | 256 |
| $\mathbb{R} \times \mathbb{R}$ | Cartesian plane | 258 |
| \mathbb{R}^2 | Cartesian plane | 258 |
| $\bigcup_{X \in \mathcal{C}} X$ | union of a family of sets | 265 |
| $\bigcap_{X \in \mathcal{C}} X$ | intersection of a family of sets | 265 |
| $\bigcup_{j=1}^n A_j$ | union of a finite family of sets | 266 |
| $\bigcap_{j=1}^n A_j$ | intersection of a finite family of sets | 267 |
| $\bigcup_{j=1}^{\infty} B_j$ | union of an infinite family of sets | 267 |
| $\bigcap_{j=1}^{\infty} B_j$ | intersection of an infinite family of sets | 267 |
| $\{A_\alpha \mid \alpha \in \Lambda\}$ | indexed family of sets | 268 |
| $\bigcup_{\alpha \in \Lambda} A_\alpha$ | union of an indexed family of sets | 268 |
| $\bigcap_{\alpha \in \Lambda} A_\alpha$ | intersection of an indexed family of sets | 268 |
| $n!$ | n factorial | 188 |
| f_1, f_2, f_3, \dots | Fibonacci numbers | 202 |
| $s(n)$ | sum of the divisors of n | 284 |
| $f : A \rightarrow B$ | function from A to B | 285 |
| $\text{dom}(f)$ | domain of the function f | 285 |
| $\text{codom}(f)$ | codomain of the function f | 285 |
| $f(x)$ | image of x under f | 285 |
| $\text{range}(f)$ | range of the function f | 287 |
| $d(n)$ | number of divisors of n | 292 |
| I_A | identity function on the set A | 298 |

| Symbol | Meaning | Page |
|---|---|------|
| p_1, p_2 | projection functions | 304 |
| $\det(A)$ | determinant of A | 305 |
| A^T | transpose of A | 305 |
| R_n | $R_n = \{0, 1, 2, \dots, n - 1\}$ | 296 |
| $\det : M_{2,2} \rightarrow \mathbb{R}$ | determinant function | 323 |
| $g \circ f : A \rightarrow C$ | composition of functions f and g | 325 |
| f^{-1} | the inverse of the function f | 338 |
| Sin | the restricted sine function | 349 |
| Sin^{-1} | the inverse sine function | 349 |
| $\text{dom}(R)$ | domain of the relation R | 364 |
| $\text{range}(R)$ | range of the relation R | 364 |
| $x R y$ | x is related to y | 366 |
| $x \not R y$ | x is not related to y | 366 |
| $x \sim y$ | x is related to y | 366 |
| $x \not\sim y$ | x is not related to y | 366 |
| R^{-1} | the inverse of the relation R | 373 |
| $[a]$ | equivalence class of a | 391 |
| $[a]$ | congruence class of a | 392 |
| \mathbb{Z}_n | the integers modulo n | 402 |
| $[a] \oplus [c]$ | addition in \mathbb{Z}_n | 404 |
| $[a] \odot [c]$ | multiplication in \mathbb{Z}_n | 404 |
| $\text{gcd}(a, b)$ | greatest common divisor of a and b | 414 |
| $f(A)$ | image of A under the function f | 351 |
| $f^{-1}(C)$ | pre-image of C under the function f | 351 |
| $A \approx B$ | A is equivalent to B | 452 |
| | A and B have the same cardinality | |
| \mathbb{N}_k | $\mathbb{N}_k = \{1, 2, \dots, k\}$ | 455 |
| $\text{card}(A) = k$ | cardinality of A is k | 455 |
| \aleph_0 | cardinality of \mathbb{N} | 465 |
| c | cardinal number of the continuum | 482 |