# Appendix E

# List of Symbols

| | |
|---|---|
| $\{1, 2, 3, 4\}$ | set notation, 11 |
| $\mathbf{N}$ | natural numbers, 11 |
| $\mathbf{Z}$ | integers, 11 |
| $\mathbf{Z}^+$ | positive integers, 11 |
| $\mathbf{Z}^-$ | negative integers, 11 |
| $\mathbf{R}$ | real numbers, 11 |
| $\mathbf{R}^+$ | positive real numbers, 11 |
| $\mathbf{R}^-$ | negative real numbers, 11 |
| $\mathbf{R}^2$ | Euclidean Plane, 11 |
| $\mathbf{Q}$ | rational numbers, 11 |
| $\mathbf{Q}^+$ | positive rational numbers, 11 |
| $\mathbf{Q}^-$ | negative rational numbers, 11 |
| $\emptyset$ | empty set, 11 |
| $\in$ | element of, 12 |
| $\notin$ | not element of 12 |
| $\subset$ | subset 13 |
| $S = T$ | set equality, 13 |
| $B(a, b : c, d)$ | box, 13 |
| area$(B(a, b, : c, d))$ | area of a box, 14 |
| $S_1 \cup S_2 \cup \cdots \cup S_n$ | set union, 14 |
| $\bigcup_{i=1}^{n} S_i$ | set union, 14 |

| | |
|---|---|
| $S_1 \cap S_2 \cap \cdots \cap S_n$ | set intersection, 14 |
| $\bigcap_{i=1}^{n} S_i$ | set intersection, 14 |
| $A \setminus B$ | set difference, 16 |
| $[a, b), (-\infty, a]$ etc. | intervals, 17 |
| $S_a^r$ | Area under graph of power function, 19 |
| $\mathrm{cir}(S_a^r)$ | circumscribed box, 22 |
| $\|\!\|\!\|$ | end of proof, 33 |
| $K_I$ | inner snowflake, 40 |
| $K_O$ | outer snowflake, 40 |
| $K_I, K_O$ | snowflakes, 48 |
| $\bigcup_{n=1}^{\infty} I_n$ | infinite union, 48 |
| $\bigcap_{n=1}^{\infty} O_n$ | infinite intersection, 48 |
| $\Longleftrightarrow$ | if and only if, 52 |
| $\Longrightarrow$ | implies, 53 |
| $\{x \in T : P(x)\}$ | set notation, 56 |
| $\{x : P(x)\}$ | set notation, 56 |
| $\mathbf{Z}_{\geq n}$ | integers $\geq n$, 57 |
| $\mathbf{R}_{\geq a}$ | real numbers $\geq a$, 57 |
| $(a, b)$ | ordered pair, 57 |
| $(a, b, c)$ | ordered triple, 57 |
| $A \times B$ | Cartesian product, 57 |
| $f(x)$ | function notation, 58 |
| $f : A \longrightarrow \mathbf{B}$ | $f$ is a function from $A$ to $B$, 58 |
| $\max(x, y)$ | maximum of $x$ and $y$, 58 |
| $\min(x, y)$ | minimum of $x$ and $y$, 58 |
| $\|x\|$ | absolute value of $x$, 59, 116 |
| $\{f(n)\}$ | sequence, 59 |
| $f(A)$ | $f$ image of $A$, 61 |
| $\sum_{i=k}^{n} x_i$ | $x_k + x_{k+1} + \cdots + x_n$, 63 |
| $\mathbf{a}, \mathbf{b}, \cdots$ | points in $\mathbf{R}^2$, 68 |
| $\mathbf{ab}$, $[\mathbf{ab}]$ | line (segment), 70 |

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|---|---|
| $I$ | identity function, 73 |
| $H$ | reflection about horizontal axis, 73 |
| $V$ | reflection about vertical axis, 73 |
| $D_+$ | reflection about $y = x$, 73 |
| $D_-$ | reflection about $y = -x$, 73 |
| $R_{\pi/2}$ | rotation, 73 |
| $R_{-\pi/2}$ | rotation, 73 |
| $R_\pi$ | rotation, 73 |
| $\mathbf{a} + S$ | translate of set, 75 |
| $d(\mathbf{a}, \mathbf{b})$ | distance from $\mathbf{a}$ to $\mathbf{b}$, 79 |
| $\text{distance}(\mathbf{a}, \mathbf{b})$ | distance from $\mathbf{a}$ to $\mathbf{b}$, 80 |
| $C(P, r)$ | circle, 80 |
| $\alpha(S)$ | area of $S$, 84, 89 |
| $\text{area}(S)$ | area of $S$, 89 |
| $\mu(P)$ | mesh of $P$, 89 |
| $S_a^b f$ | set of points under graph($f$), 90 |
| $T_{\mathbf{c}} = T_{(a,b)}$ | right triangle 95 |
| $A_a^b f$ | area under graph of $f$, 100, 103 |
| $A_a^b[f(t)]$ | area under graph of $f$, 100 |
| $L(x)$ | logarithm, 104 |
| $\ln(x)$ | logarithm, 104 |
| $e$ | antilog(1), 108 |
| $\|x\|$ | absolute value, 59, 116 |
| $\text{dist}(x, y)$ | distance from $x$ to $y$, 117 |
| $\{a_n\} \to L$ | $\{a_n\}$ converges to $L$, 122 |
| $\lim\{a_n\} = L$ | $\{a_n\}$ converges to $L$, 125 |
| $\sum(f, P, S)$ | Riemann sum, 152 |
| $\int_a^b f$, $\int_a^b f(t)\, dt$ | integral, 160, 167, 208 |
| $W$ | a function for $\mathbf{R}$ to the unit circle, 190 |
| sin | sine, 191 |
| cos | cosine, 191 |
| `fi` | end of if (in Maple), 205 |
| $\int f(t)dt$ | indefinite integral, 213 |
| $\int f(t)dt$ | antiderivative, 328 |
| $F(t)\,\|_a^b$,$F\,\|_a^b$ | $F(b) - F(a)$, 213 |

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|---|---|
| $\{E_1(x,y)\}$ | $\{(x,y) \in \mathbf{R}^2 : E(x,y)\}$, 219 |
| $\lim_{x \to a} f(x) = L$ | limit of a function, 225 |
| $f'(a)$ | derivative of $f$ at $a$, 230 |
| $\dfrac{d}{dx}$ | notation for derivatives, 241 |
| $\tan, \cot, \sec, \csc$ | trigonometric functions 247 |
| $f \circ g$ | composition of functions, 248 |
| $E$ | exponential function, 293 |
| exp | exponential function, 297 |
| $a^x$ | general power function, 297 |
| arccos | inverse cosine, 302 |
| arcsin | inverse sin, 303 |
| arctan | inverse tangent, 303 |
| arccot | inverse cotangent, 304 |
| sinh | hyperbolic sine, 305 |
| cosh | hyperbolic cosine, 305 |
| $f', f^{(n)}$ | notation for derivatives, 306 |
| $f'(x), f''(x), f^{(1)}(x), f^{(n)}(x)$ | notation for derivatives, 306 |
| $\dfrac{d^n f}{dx^n}$ | notation for derivatives, 306 |
| $g$ | acceleration due to gravity, 310 |
| $\int f$, $\int f(x)dx$ | antiderivative, 328 |
| $\int f(x)dx$ | indefinite integral, 213 |
| Si | sine integral, 330 |
| Ei | exponential integral, 330 |
| erf | error function, 330 |
| `(D@@n)(f)` | $f^{(n)}$, Maple command, 389 |
| `f@g` | $f \circ g$, Maple command, 390 |