

Symbol Index

Applied Linear Algebra, by Peter J. Olver and Chehrzad Shakiban

Symbol	Meaning	Page(s)
$c + d$	addition of scalars	9
$A + B$	addition of matrices	6
$V + W$	addition of subspaces	88
$\mathbf{v} + \mathbf{w}$	addition of vectors	6, 78
$f + g$	addition of functions	80
cd	multiplication of scalars	9
$c\mathbf{v}$, cA , cf	scalar multiplication	6, 78, 80
$K > 0$	positive definite	154, 385
$\#$	number of elements	126
$\binom{n}{k}$	binomial coefficient	59, 380
$ \cdot $	absolute value, modulus, norm	171
$\ \cdot\ $	norm	131, 132, 134, 144, 176, 530
$\ \cdot\ $	matrix norm	530
$\ \cdot\ _2$	Euclidean norm	131, 145, 534
$\ \cdot\ _\infty$	max norm	145, 532
$\ \cdot\ _p$	p norm	145
$\ \cdot\ _{p,w}$	weighted p norm	147
$\ \cdot\ _F$	Frobenius norm	536
$\mathbf{v} \cdot \mathbf{w}$	dot product	131, 154
$\mathbf{z} \cdot \mathbf{w}$	Hermitian dot product	175
$\langle \cdot, \cdot \rangle$	inner product	132, 134, 176, 612
$\langle\langle \cdot, \cdot \rangle\rangle$	inner product	382, 612
$\langle\langle\langle \cdot, \cdot \rangle\rangle\rangle$	inner product	384
$[\cdot, \cdot]$	commutator	10, 343, 483
$[a, b]$	closed interval	80
(a, b)	open interval	80
$[a, b), (a, b]$	half open interval	80
$\{f \mid C\}$	set	xx
\setminus	set theoretic difference	xx

\cup	union	88
\cap	intersection	65, 88
\in	element of	xx
\notin	not element of	xx
\subset, \subseteq	subset	xx
\supset	superset	xx
$f: X \rightarrow Y$	function	xx
$x_n \rightarrow x$	convergent sequence	xx
\equiv	equality of functions	xx
\circ	composition	341
\times	Cartesian product	83
\times	cross product	140, 221
\sim	agreement at sample points	279
\bar{f}	mean or average	86
\bar{z}	complex conjugate	170, 174, 377
\bar{q}	conjugate quaternion	352
$\sum_{i=1}^n$	summation	xx
$\prod_{i=1}^n$	product	xx
u', u'', \dots	space derivatives	xx, 173
\dot{u}, \ddot{u}, \dots	time derivatives	xx
$\frac{du}{dx}, \frac{d^2u}{dx^2}, \dots$	ordinary derivatives	xx, 585
$\frac{\partial u}{\partial x}, \frac{\partial u}{\partial t}, \frac{\partial^2 u}{\partial x^2}, \frac{\partial^2 u}{\partial x \partial t}, \dots$	partial derivatives	xx
∂_x	partial derivative operator	338
∇	gradient	338, 563
$\nabla \cdot$	divergence	88
$\int f(x) dx$	indefinite integral	xx
$\int_a^b f(x) dx$	definite integral	xx
$f(y^+), f(y^-)$	one-sided limits	601
A^{-1}	matrix inverse	31
L^{-1}	inverse linear function	344
A^T	matrix transpose	44
A^{-T}	inverse transpose	45

A^\dagger	Hermitian adjoint	178, 435
A^+	pseudoinverse	430
A^*	reduced incidence matrix	320
L^*	adjoint operator	382, 613
V^*	dual space	339
$(A \mid \mathbf{b})$	augmented matrix	12
\mathcal{A}	space of analytic functions	86
a_{ij}	matrix entry	4
B_1	unit ball	148
\mathbb{C}	complex numbers	xx, 170
\mathbb{C}^n	n -dimensional complex space	174
coker	cokernel (left null space)	115
corng	corange (row space)	115
cos	cosine function	173
cosh	hyperbolic cosine	173
C^0	space of continuous functions	86, 176
C^n	space of continuously differentiable functions	86, 88
C^∞	space of smooth functions	86
D	derivative operator	337
$d(\mathbf{v}, \mathbf{w})$	distance	146
D_A	Gerschgorin domain	537
D_k	Gerschgorin disk	537
D^k	k^{th} derivative operator	342
$\mathcal{D}^{(k)}$	space of k^{th} order differential operators	344
det	determinant	33, 71, 403
diag	diagonal matrix	8
dim	dimension	102
e	base of natural logarithm	172
e^t	exponential function	391
e^z	complex exponential	171
e^A	matrix exponential	473
\mathbf{e}_i	standard basis vector	37, 101
\mathcal{F}	function space	80, 81, 82
$G(x, y)$	Green's function	606, 609
\mathbb{H}	quaternions	352
H_n	Hilbert matrix	58

$i = \sqrt{-1}$	imaginary unit	170
i	unit quaternion	352
\mathbf{i}	standard basis vector in \mathbb{R}^3	101
I, I_n	identity matrix	8
I_V	identity function	344
Im	imaginary part	170
j	unit quaternion	352
\mathbf{j}	standard basis vector in \mathbb{R}^3	101
J_a	Jordan block matrix	402
k	unit quaternion	352
\mathbf{k}	standard basis vector in \mathbb{R}^3	101
K_n	complete graph	128
$K_{m,n}$	complete bipartite digraph	128
\ker	kernel (null space)	107, 366
L^2	Hilbert space, inner product, norm	135, 176
L^p	function space norm	145
L_k	Lagrange polynomial	203
$L[\mathbf{v}]$	linear function	331
$\lim_{x \rightarrow y}, \lim_{n \rightarrow \infty}$	limits	595, 599
$\lim_{x \rightarrow y^-}, \lim_{x \rightarrow y^+}$	one-sided limits	601
$\mathcal{L}(V, W)$	space of linear functions	338
\log	natural (base e) logarithm	xx
\log_a	base a logarithm	xx
\max	maximum	145
\min	minimum	
$\mathcal{M}_{m \times n}$	space of $m \times n$ matrices	79, 338
mod	modular arithmetic	xx
$\mathbf{0}$	zero vector	68, 79
$O, O_{m \times n}$	zero matrix	8
\mathcal{O}^+	positive orthant	85
p_A	characteristic polynomial	401
P_k	Legendre polynomial	250
$\mathcal{P}^{(n)}$	space of polynomials of degree $\leq n$	80
$\mathcal{P}^{(\infty)}$	space of all polynomials	86
ph	phase or argument	xx, 171
\mathbb{Q}	rational numbers	xx
\mathbb{R}	real numbers	xx

\mathbb{R}^n	n -dimensional Euclidean space	79
\mathbb{R}^∞	space of infinite sequences	83
R_θ	rotation	333
rank	rank	62
Re	real part	170
rng	range (column space)	107, 370
S_1	unit sphere	85, 148
S_j	sinc function	211
sec	secant function	173
sech	hyperbolic secant	208
sign	sign of permutation	73
sin	sine function	173
sinh	hyperbolic sine	173
span	span	89
T_k	Chebyshev polynomial	255
$\mathcal{T}^{(n)}$	space of trigonometric polynomials of degree $\leq n$	92, 225
$\mathcal{T}^{(\infty)}$	space of all trigonometric polynomials	93
tan	tangent function	173
tr	trace	87, 403
W^\perp	orthogonal complement	268
\mathbb{Z}	integers	xx
β	B -spline	635
δ, δ_y	delta function	594, 596
δ', δ'_y	derivative of delta function	603
Δ	Laplacian	338, 343, 368
ε_j	dual basis vectors	339
ζ_n	root of unity	280
κ	condition number	429
λ_i	eigenvalue	395
π	area of unit circle	172
ρ	spectral radius	524
ρ, ρ_y	ramp function	600
ρ_n	n^{th} order ramp function	600
σ, σ_y	step function	599
σ_i	singular value	426
ω_k	sampled exponential	279