

Index

- LU* factorization, 377
- angle between vectors, 482, 513
- attractor, 649
- augmented matrix, 22
- back substitution, 26
- back-face culling, 491
- basic variable, 28
- basis, 115
- basis for a vector space, 412
- Binet's formula, 329
- Cauchy-Schwarz inequality
 - in \mathbb{R}^n , 490
- change of basis matrix, 461
- characteristic equation, 299
- characteristic polynomial, 299
- characteristic value, 170
- characteristic vector, 170
- circuits
 - junctions, 4
 - resistor, 3
 - source, 3
- codomain of a matrix transformation, 128
- coefficient matrix, 22
- cofactor, 283
- column space, 235
- companion matrix, 356
- complex conjugate, 685
- complex number, 683
 - imaginary part, 683
 - real part, 683
- condition number of a matrix, 611
- contraction, 140
- coordinate transformation, 447
- coordinate vector with respect to a basis, 446
- coordinates with respect to a basis, 446
- covariance matrix, 438
- Cramer's Rule, 371
- cross product, 492
- determinant, 283
- diagonal matrix, 153
- diagonal of a matrix, 153
- differential equation, 672
- dimension
 - subspace of \mathbb{R}^n , 265
- distance between vectors, 481
- distance between vectors in an inner product space, 512
- domain of a matrix transformation, 128
- dominant eigenvalue, 333
- dominant eigenvector, 333
- dot product, 150, 479
- dynamical system, 173
- eigenspace, 251
- eigenvalue, 170
- eigenvector, 170
- elementary operations, 7
- equivalent statements, 203
- Fibonacci sequence, 314
- field, 59
- forward elimination, 26
- Fourier coefficients, 529
- free variable, 28
- Gaussian quadrature, 542
- Gershgorin Disk Theorem, 360
- Gram-Schmidt Process
 - in an inner product space, 533

- Hamming code, 405
- Hausdorff dimension, 652
- homogeneous system, 82

- identity matrix, 152
- image of an element under a transformation, 128
- inner product, 510
- inner product space, 510
- input-output models, 97
- Invertible Matrix Theorem, 204
- isometry, 500
- isomorphism, 642
- iterated function system, 649

- kernel, 233
- Kirchoff's Current Law, 17
- Kirchoff's Voltage Law, 17

- Lagrange polynomials, 667
- Latent Semantic Indexing, 581
- leading entry of a row, 42
- length of a vector in an inner product space, 512
- Leslie matrix, 344
- linear combination, 65
 - weights, 65
- linear combination of vectors in a vector space, 396
- linear dependence, 107
- linear dependent vectors in a vector space, 409
- linear equation, 6
 - coefficients, 6
- linear independence, 107
- linear transformation, 638
 - diagonalizable, 673
 - eigenvalue, 672
 - eigenvector, 672
 - kernel, 640
 - matrix of, 658
 - onto, 639
 - range, 641
 - standard matrix, 657
- linearly independent vectors in a vector space, 409
- lower triangular matrix, 154

- Markov chain, 180, 181
- Markov process, 179, 180
- matrix, 22
 - adjugate, 370
 - column, 23
 - columns, 83
 - diagonalizable, 319
 - elementary, 365
 - entry, 23
 - exponential, 162
 - indefinite, 570
 - inverse, 192
 - invertible, 192
 - minor, 282
 - negative definite, 570
 - negative semidefinite, 570
 - nilpotent, 256
 - non-singular, 192
 - orthogonal, 500
 - positive definite, 570
 - positive semidefinite, 570
 - product, 147
 - row, 23
 - rows, 83
 - scalar multiple, 144
 - singular, 192
 - size, 23, 83
 - sparse, 335
 - square, 171
 - sum, 146
 - transpose, 153
- matrix transformation, 126
- matrix-vector product, 84
- minimal spanning set, 107
- moment of inertia, 577
- multiplicity
 - algebraic, 300
 - geometric, 302

- nonhomogeneous system, 82
- normal vector, 484
- null space, 233
- nullity of a matrix, 266

- Ohm's Law, 17
- one-to-one, 131
- onto, 130

- operator norm of a matrix, 582
- orthogonal, 482
- orthogonal basis in \mathbb{R}^n , 496
- orthogonal basis in an inner product space, 514
- orthogonal complement, 484
- orthogonal complement in inner product spaces, 519
- orthogonal diagonalization, 550
- orthogonal projection
 - in the direction of a vector, 484
- orthogonal projection onto a subspace, 516
- orthogonal set in \mathbb{R}^n , 496
- orthogonal set in an inner product space, 513
- orthogonal vectors in inner product spaces, 513
- orthonormal basis in \mathbb{R}^n , 499
- orthonormal basis in an inner product space, 515
- outer product decomposition, 590

- parametric vector form, 82
- partitioned matrices, 164
- pivot, 28, 42
- pivot column, 42
- pivot positions, 42
- polynomial curve fitting, 35
- power method, 333
- projection
 - orthogonal to a vector, 484
- projection orthogonal to a subspace, 516
- pseudoinverse, 614
- Pythagorean Theorem in \mathbb{R}^n , 489

- quadratic form, 567

- range of a matrix transformation, 128
- rank of a matrix, 266
- Rayleigh quotients, 335
- rotation matrix, 138
- rotation-scaling matrices, 352
- row echelon form, 41
 - reduced, 43
- row equivalent matrices, 46
- row operations, 24
- row space, 235

- scalar product, 479

- scalars, 59, 391
- self-similar set, 650
- shear, 139
- similar matrices, 316
- singular values, 587
- singular vectors
 - left, 589
 - right, 588
- span, 67
- span of a set of vectors in a vector space, 396
- spanning set, 396
- spectral decomposition, 556
- spectrum of a matrix, 554
- standard basis
 - for \mathbb{P}_n , 412
 - for \mathbb{R}^n , 115
- state vector, 174
- stochastic matrix, 184
 - regular, 186
- Strassen's algorithm, 163
- strictly diagonally dominant matrix, 360
- subspace
 - of \mathbb{R}^n , 217
 - sum, 222, 402
- subspace of a vector space, 395
- subspace of a vector space spanned by a set of vectors, 396
- symmetric matrix, 154
- system of linear equations, 6
 - consistent, 8
 - elimination, 7
 - equivalent systems, 7
 - inconsistent, 8
 - operations, 7
 - solution, 7
 - solution set, 7

- trace, 325
- transformation
 - matrix, 126
- transition matrix, 177, 180
- triangle inequality in \mathbb{R}^n , 490
- trigonometric polynomial, 527

- unit vector, 480
- unit vector in an inner product space, 512
- upper triangular matrix, 154

- vector, 58
 - column, 59
 - component, 58
 - entry, 58
 - length in \mathbb{R}^n , 63, 479
 - magnitude in \mathbb{R}^n , 479
 - norm in \mathbb{R}^n , 479
- vector space, 216, 391
 - basis, 412
 - dimension, 428
 - finite dimensional, 428
 - subspace, 395
- vector spaces
 - isomorphic, 642
- Wronskian, 681