Excursions in Computing Science:
Keyword-in-context Index

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Keyword                  W|B P N|E Pag Topic   (W|B is week|book, P is part, N|E is note|exc)
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abelian                  11d 3 E06 014 Abelian and non-Abelian symmetries.
action-at-a-distance     11d 3 N16 008 Local action versus action-at-a-distance.
active transport         09c 3 N27 022 Active transport and biochemistry.
adding                   04    N08 003 Adding 2-numbers
affine connection        11c 1 N12 037 The affine connection.
aggregates               09c 1 N04 007 Aggregates: the moments of distributions.
aharanov-bohm            11d 3 E01 012 Aharanov-Bohm effect.
al jabr                  i     E44 025 Al jabr
alpha-particles          05    N08 007 Two ways to collide alpha-particles
amplitudes               05    N01 001 Amplitudes as 2-numbers
amplitudes               06    N07 004 Transforming amplitudes
analogic reasoning       10    E26 017 Analogic reasoning
ancestor                 12    N01 001 Recursion. Define '' ancestor" in terms of ''parent".
and                      10    E53 024 {\bf xor} and {\bf and}.
angle                    02    N04 002 Component at angle
angles                   01    E03 010 Measuring angles.
angles                   04    E16 011 ruler and compass cannot trisect angles
angular excess           11c 1 E41 092 Angular excess at fixed latitude.
angular momentum         08c 3 E06 027 Angular momentum
annihilation             07c   E41 045 Creation and Annihilation.
anti-pythagoras          07a   N05 003 Anti-Pythagoras
anticommuting            04    E13 011 anticommuting matrices
antislope                09c 1 E43 061 Continuous distributions by antislope
antislopes               09c 1 E22 045 Notation, integrals and antislopes
antislopes               11d 4 N28 035 Slopes and antislopes of 2D numbers, etc.
antislopes               v   2 N07 004 Antislopes.
antislopes               v   2 N10 009 Antislopes and areas.
antisymmetric states     06    N09 004 Symmetric states and antisymmetric states
approximate              i     E45 026 Approximate arithmetic
approximating function   09    N03 004 Approximating function using important frequencies only
approximation            i     E46 027 Brocot fractional approximation
approximations           v   2 N03 002 Approximations.
areas                    07c   N06 006 Vectors and Areas and .. All Together
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carnot                     09c 2 N22 057 Carnot's reversible heat engine, second law of thermodynami
cartesian plane            v   1 N03 002 Cartesian Plane.
causality                  09c 2 E45 078 Causality.
celtic knots               01    E08 012 Celtic knots and other fun with cos and sin.
centering                  v   1 N10 012 Centering.
central forces             11d 1 N01 001 Central Forces.
centre-of-mass             07a   N12 006 Centre-of-mass reference frame
certainty                  11d 4 E08 049 Certainty and entanglement.
chain rule                 08c 3 E22 029 Slope rules, product rule, chain rule
chemical kinetics          09c 3 E30 056 Chemical kinetics and differential equations.
chemistry                  09c 3 E31 075 Chemistry in the language of physics.
chesapeake clams           09c 1 E49 070 Mutual information from Chesapeake clams.
chirality                  11d 5 N35 016 Chirality and electroweak.
choose                     ii    E41 024 Choose trees.
church-turing              07b   N01 001 Strong Church-Turing thesis
circular polarization      06    N11 005 Circular polarization to linear polarization
CkN circuits               10    E54 026 C$^k$N circuits.
clifford ''numbers"        07c   E38 031 Matrix representations of Clifford ''numbers".
clifford algebra           07c   E37 031 Factoring sums and differences of squares by Clifford algeb
clifford algebra           07c   E40 038 Spin and Clifford Algebra.
clifford functions         11d 4 E33 055 Slopes of Clifford functions.
cloning                    11d 6 N43 018 No cloning.
CO2                        08c 1 N14 017 Greenhouse gases: CO$_2$
co-ignorance               09c 1 N10 031 Correlation and co-ignorance.
collision                  09c 3 N24 012 Collision theory.
collisions                 09c 2 N12 001 A gas simulation 1: the collisions
combined transport         09c 3 N28 024 Combined transport. Onsager relations.
commutator algebra         08c 3 E16 028 Commutator algebra, Lie groups
commutator algebra         08c 3 N28 006 Commutator algebra.
commute                    11c 1 E01 075 Slopes commute?
compass                    02    E17 012 ruler and compass
complementary quantitie    08c 4 N35 016 Symmetry and Conservation: Complementary Quantities
complementary variables    09c 2 E33 077 Complementary variables.
component                  02    N03 002 Horizontal component
component                  02    N04 002 Component at angle
compression                09    N08 012 Compression and Content
conditional distributio    09c 1 N11 034 Conditional distributions and ignorance.
conflict                   09c 2 E11 064 Doves and hawks. (A kinetic theory of conflict, 1.)
conflict                   09c 2 E12 066 Dominance. (A kinetic theory of conflict, 2.)
conic sections             08c 3 E37 032 Conic sections.
conjugates                 04    E10 010 Conjugates.
conservation               11d 4 N29 042 Charge conservation and antimatter.
conserved                  07a   N10 005 Energentum is conserved.
constant sums              09c 1 E46 068 Geometrical interpretations of constant sums.
constellations             ii    E47 026 Nine constellations.
continued fractions        10    E12 015 Continued fractions
continued fractions        i     E47 027 Better than Brocot: continued fractions.
continuity                 12    E19 017 Continuity.
continuous groups          08c 3 N26 002 Continuous groups.
control                    11    N02 005 Control: thermostat
control                    11    N03 006 Electric blanket control
controlled-exchange        10    N06 007 Reversibility: controlled-not, controlled-exchange
controlled-not             10    N06 007 Reversibility: controlled-not, controlled-exchange
coordinates                11c 1 N02 002 '' Reality" and coordinates.
coprimes                   i     E49 030 Coprimes and greatest common divisor.
copying state              12    N08 007 Copying state.
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correlation            09c 1 N10 031 Correlation and co-ignorance.
correlation            09c 3 N23 002 Correlation.
cos                    01    E08 012 Celtic knots and other fun with cos and sin.
cos                    01    E14 016 Useful cos and sin.
cos                    02    E02 009 values for cos, sin
cos                    04    N04 002 cos + sqrt(-1)sin as rotation
cosine                 01    N04 004 Cosine
cosine                 iv    E09 014 Cosine and sine.
cosmology              11c 2 N31 033 Cosmology.
counting               i     E02 017 Counting in tongues.
creation               07c   E41 045 Creation and Annihilation.
criticality            09c 4 E26 033 Self-Organized Criticality.
cross product          07c   E31 020 Gibbs cross product
cross-products         11d 1 N06 013 Invariants, cross-products and convention.
crystal symmetries     08c 2 N24 016 Non-translational crystal symmetries.
crystals               08c 2 N20 003 1D crystals, gratings, CDs
crystals               08c 2 N21 006 2D crystals
cube root              v   2 N01 001 Cube root of 8.
cube roots             i     N06 010 Square roots and cube roots
cubes                  i     E07 017 Cubes.
cubic                  v   2 N04 003 Slope of cubic.
curl                   11c 1 N06 013 Divergence and Curl.
curl                   11c 1 N15 046 Gradient, divergence and curl with absolute slope.
current                11d 5 E14 037 Current from faze invariance.
curvature              11c 1 E37 090 Absolute slope and curvature.
curvature              11c 1 E46 100 Curvature of lines.
curvature              11c 1 N17 053 Curvature.
curvature tensor       11c 1 E40 092 Number of components of the curvature tensor.
curves                 v   1 N09 010 Slopes of curves.
cycles                 09c 2 E14 071 Cycles.
dark energy            11c 2 N32 037 Negative pressure and dark energy.
database search        11d 6 N44 019 Database search.
de moivre              04    E01 006 De Moivre
decision trees         09c 1 E64 083 Decision trees.
densities              09c 1 N03 005 Distributions and densities.
density matrices       11d 4 E07 049 Density matrices and inverse tensor product.
determinant            03    N07 005 unit determinant
determinant            08c 1 N08 005 Matrix invariant sets share eigenvalues, determinant, trace
determinants           03    N08 006 Digression on determinants.
deutsch                07b   N07 005 Developments after Deutsch's seminal 1985 paper
diagonalizing          iv    E22 024 Diagonalizing matrices.
diagonalizing          iv    N10 009 Diagonalizing matrices.
diagrams               11d 5 N34 013 Diagrams and QED.
differences            i     N03 005 Rules and differences
differential equations 09c 3 E30 056 Chemical kinetics and differential equations.
differential equations 09c 3 E30 062 Coupled linear first-order differential equations.
diffusivity            09c 3 N25 016 Mobility, diffusivity and Brownian motion.
digital signal processo 09   E24 022 Digital signal processor, DSP filters.
dirac equation         08c 4 E41 052 Dirac equation
direct                 08c 1 N09 006 Other representations: trivial, direct, permutation
direction cosines      07c   E30 019 Direction cosines.
dispersion relations   11d 2 E07 026 Dispersion relations.
dissipation            09c 3 N26 019 Three potentials and dissipation.
distance               03    N01 001 time and distance
distribution           09c 1 E48 069 When is a distribution the product of its marginals?
distribution continuous 09c 1 E40 057 Continuous distributions.
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euclid's algorithm        i      E51 031 Euclid's algorithm.
euclid's elements         10     E60 028 Euclid's Elements.
eugene                    01     E07 011 Eugene's Clock
euler                     i      E53 035 Fermat and Euler on modular powers.
euler angles              06     N03 002 Euler angles, transformation matrix
euler angles              06     N06 003 Special Euler angles
euler's formula           07c    E24 017 Euler's formula, edges, faces, vertices
euler's formula           12     E13 010 Euler's formula, edges, faces, vertices
expectation               09c 1  N07 021 Expectation, surprise and ignorance.
factor analysis           08     E10 017 Factor analysis/Principal components analysis in the measur
factorial                 ii     E40 024 Factorial trees.
factorials                ii     N07 007 Factorials.
faze invariance           11d 5  E14 037 Current from faze invariance.
fermat                    i      E53 035 Fermat and Euler on modular powers.
fermat                    i      E56 039 Fermat's little theorem again.
fermions                  05     N09 008 Two ways to collide electrons - new Feynman rule - bosons,
fermions                  06     N14 007 Fermions and Bosons.
fermions                  11d 4  N27 033 Fermions.
fermions                  11d 5  N31 002 Fermions.
ferromagnets              09c 4  N34 018 Ferromagnets.
feynman                   05     N03 002 Feynman's rules
feynman                   11d 5  E25 038 Feynman's program Hamiltonian.
feynman rule              05     N09 008 Two ways to collide electrons - new Feynman rule - bosons,
fft                       09     E14 014 FFT again.
fft                       09     N05 007 The fast Fourier transform, FFT
field                     11d 4  N24 024 A simple field.
fields                    11c 1  N01 001 Fields and slopes.
fields                    11c 1  N10 031 Fields in gypsum.
fission                   07a    N14 007 Fission
fizzmezh                  03     E20 013 The weird fizzmezh matrices.
flatness                  11c 1  E42 096 Local flatness.
flipflop                  11     N01 001 Memory: flipflop, feedback automata
fluctuations              09c 2  N15 021 Fluctuations, variations and samples.
forces                    08c 4  E21 042 Forces and deformations.
forces                    11d 3  N17 009 Other symmetries, other forces.
formal properties         04     N07 003 formal properties of numbers
fourier transf discrete 09      E23 022 Two-dimensional discrete Fourier transform
fourier transform         04     E14 011 Fourier transform inverse
fourier transform         09     E17 015 Modified inverse Fourier Transform.
fourier transform         09     E18 017 Fourier Transform with vector $k,\ell$.
fourier transform         09     E19 019 Continuous Fourier Transform.
fourier transform         09     N02 002 Fourier transform, FT
fourier transform         11d 6  N39 012 Binary Fourier transform.
fourier transform         11d 6  N40 013 Quantum Fourier transform.
fourier transform fast   09      N05 007 The fast Fourier transform, FFT
fractals                  12     N03 002 Fractals
fractional                i      E46 027 Brocot fractional approximation
fractional dimension      12     E28 021 Fractional dimension
fractions                 i      E48 029 Making fractions clear.
freqnum                   07a    N08 004 The pre-timespace limit for freqnum.
frequency                 07a    N04 002 Energy, momentum and frequency, wavenumber - Planck's const
fulladder                 10     N05 005 Switching circuits: halfadder, fulladder
function                  v   1  N06 006 Zeros of a function.
functionals               11d 5  N32 005 Functionals.
functions                 02     N10 008 product of functions, sum of arguments
functions                 09c 2  E32 076 Local inverses of functions.
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heat conduction        09c 3 E24 037 Viscosity and heat conduction.
hermite                iii   E27 018 Hermite polynomials.
hermite polynomials    09c 1 E24 046 Legendre polynomials and Hermite polynomials.
hermitian transposes   11d 4 E31 054 Hermitian transposes of reflections, etc.
hexagonal numbers      12    E14 010 {\em Hexagonal numbers
hexahedra              08c 1 N17 024 Hexahedra Octahedra.
hierarchies            09c 2 E13 069 Hierarchies.
higgs                  11d 3 E07 016 Goldstone and Higgs mechanisms.
histogram arithmetic   09c 1 N02 002 Histogram arithmetic.
histograms             09c 1 E07 042 Program to add histograms
histograms             09c 1 N01 001 Histograms.
hookean solid          09c 3 E26 044 Hookean solid.
hotplate geometry      11c 1 E36 087 Hotplate geometry.
huygens                11d 5 E22 038 Huygens 3D.
hyperboloid            11c 1 E51 106 Hyperboloid.
hypercube              i     E09 018 Hypercube numbers.
hypercubes             i     E24 020 Hypercubes: higher-dimensional squares.
hypercubes             ii    E60 031 Hypercubes.
hyperdipyramids        i     E25 021 Hyperdipyramids: higher-dimensional squares, part 2.
hyperspheres           01    E16 021 Hyperspheres.
hyperspheres           09c 1 E44 064 Hyperspheres.
icosahedra             08c 1 N18 025 Dodecahedra Icosahedra.
identity               iv    N03 003 Identity matrix.
ige                    v   2 E11 016 Gini and IGE.
ignorance              09c 1 E34 051 Increasing ignorance.
ignorance              09c 1 E42 059 Ignorance and continuous distributions.
ignorance              09c 1 N07 021 Expectation, surprise and ignorance.
ignorance              09c 1 N08 024 Does ignorance ever decrease?
ignorance              09c 1 N11 034 Conditional distributions and ignorance.
imagine that!          04    N06 002 sqrt(-1) as ``imagine that!", 2-dimensional numbers
implication            10    N03 003 Implication operator
importance of a web pag 08   N01 001 Importance of a web page: cycles
importance of a web pag 08   N02 002 Importance of a web page: no cycles
index notation         11c 1 N03 005 Index notation and tensors.
individuality          09c 4 N35 020 Particle individuality and Bose-Einstein condensation.
induction              12    N04 003 Mathematical induction.
inelastic collisions   07a   N11 006 Inelastic collisions
infinite groups        08c 2 N19 002 Infinite groups
infinite series        v   1 N15 020 Infinite series.
infinite series        v   1 N16 021 Programming the infinite series.
infinities             09c 4 E21 029 Infinities.
infinity               10    E11 013 More than one kind of infinity
inflation              11c 2 E25 052 Inflation.
inflection             09c 4 E07 027 Point of inflection.
inside knowledge       09c 1 N09 028 Inside knowledge: the clients of Joe and Sue revisited.
instantiation          12    N07 006 Instantiation.
integrals              09c 1 E22 045 Notation, integrals and antislopes
interest               ii    N05 005 Interest.
interpreting numbers   04    E06 008 Interpreting numbers
interval               07a   N06 003 Interval is invariant
interval algebra       07c   N11 010 Interval algebra in 3D.
intervals              07c   N10 010 Intervals plus locations.
intervals              i     E52 032 How many intervals?
intervals              iv    N06 006 Positions and intervals.
invariant              07a   N06 003 Interval is invariant
invariant (normal) subg 08c 1 N07 005 Invariant (normal) subgroups
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invariant sets          08c 1 N06 004 Invariant sets
invariant sets          08c 1 N08 005 Matrix invariant sets share eigenvalues, determinant, trace
invariants              11d 1 N06 013 Invariants, cross-products and convention.
inverse                 04    E14 011 Fourier transform inverse
inverse                 iv    N04 003 Matrix inverse.
inverses                v   1 E08 030 Inverses.
irreversibility         11c 2 N33 039 Gravitational irreversibility.
ising model             09c 4 E27 035 Ising model.
isospin                 08c 4 N34 013 Isospin and quarks
iterate                 08    N09 010 Iterate!
jpeg                    09    N04 005  Joint Photographic Experts Group, JPEG
kepler i                08c 3 E38 034 Kepler I.
kepler ii               08c 3 E09 027 Kepler II.
kepler iii              08c 3 E36 031 Kepler III
kerr orbits             11c 2 N27 019 Kerr orbits and black holes.
key distribution        01    E20 024 Quantum key distribution.
key distribution        11d 6 N42 017 Quantum key distribution.
kinetic theory          09c 2 E11 064 Doves and hawks. (A kinetic theory of conflict, 1.)
kinetic theory          09c 2 E12 066 Dominance. (A kinetic theory of conflict, 2.)
kirchhoff circuits      09c 3 E19 029 Kirchhoff circuits.
kirchhoff lattices      09c 3 E21 031 Kirchhoff lattices: relations and operators.
l-systems               12    N06 004 L-systems
lac operon              11    N04 008 Biology: the lac operon of E.coli, gene expression, attract
language                11    N05 009 Language: parsing by finite automaton
laplace's equation      11d 2 N08 001 Partial Slope Equations: Laplace's Equation.
lattice dynamics        09c 3 E27 048 Lattice statics and lattice dynamics.
lattice statics         09c 3 E27 048 Lattice statics and lattice dynamics.
least squares           v   2 E11 018 Least squares fit.
least squares filter    09c 3 E05 027 Least squares filter.
legendre                iii   E27 018 Legendre polynomials.
legendre polynomials    09c 1 E24 046 Legendre polynomials and Hermite polynomials.
legendre transformation 08c 4 E37 050 Legendre transformation.
levi-civita symbol      11c 1 E23 081 Levi-Civita symbol, alternating tensors.
lie groups              08c 3 E16 028 Commutator algebra, Lie groups
light                   02    N01 001 Operators: polarizing light
light                   02    N02 002 Light beam as vector
light                   05    N07 005 Light travels in straight lines
light                   06    N01 001 Two polarization states of light
light                   06    N10 005 Spin-1 and polarized light
light orbits            11c 2 N29 028 Light orbits.
lightspeed              06    N13 006 Lightspeed eliminates a third dimension
limits                  v   1 N11 013 Limits.
linear equations        08    N04 004 Linear equations: Elementary row operations
linear operator         02    E16 011 linear operator
linear polarization     06    N11 005 Circular polarization to linear polarization
linear polarization     06    N12 006 Linear polarization rotates in two dimensions
local action            11d 3 N16 008 Local action versus action-at-a-distance.
local inverses          09c 2 E32 076 Local inverses of functions.
locations               07c   N10 010 Intervals plus locations.
logic                   10    E52 021 Matrix logic.
logic                   10    E55 026 Basic matrices for logic.
logic circuits and gate 07b   N03 001 Logic circuits and gates, not, Hadamard
logo programming        04    E03 007 Logo programming language
lorentz                 03    E19 013 Lorentz ($c\neq1$).
lorentz transformation  03    N09 007 Lorentz transformation
lorentz transformation  03    N10 009 Using the Lorentz transformation.
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magnetic fields          11d 1 E09 022 Visualizing magnetic fields.
marginals                09c 1 E48 069 When is a distribution the product of its marginals?
marilyn vos savant       09c 1 E63 082 Marilyn vos Savant on the Monty Hall problem.
matrices                 03    E20 013 The weird fizzmezh matrices.
matrices                 04    E13 011 anticommuting matrices
matrices                 04    N01 001 Matrices as numbers?
matrices                 10    E55 026 Basic matrices for logic.
matrices                 10    N07 010 Operators as matrices
matrices                 11d 4 N19 008 Small matrices.
matrices                 iv    E22 024 Diagonalizing matrices.
matrices                 iv    N10 009 Diagonalizing matrices.
matrix                   03    N06 005 matrix from fixed directions, eigenvalues
matrix                   07c   E33 024 Tensor Calculator I. Matrix representation.
matrix                   07c   E38 031 Matrix representations of Clifford ''numbers".
matrix                   08c 1 N08 005 Matrix invariant sets share eigenvalues, determinant, trace
matrix                   10    E52 021 Matrix logic.
matrix                   11d 5 E06 035 Matrix Gaussians.
matrix                   iv    N01 001 Matrix multiplication.
matrix                   iv    N04 003 Matrix inverse.
matrix mechanics         07c   E39 033 Matrix Mechanics.
matrix operations        07c   N13 013 Appendix: Summary of vector and matrix operations
matrix representation    08c 1 N10 007 Using traces to block-diagonalize a whole matrix representa
maximum speed            03    N04 003 maximum speed
maxwell distribution     09c 2 E19 074 Maxwell distribution.
maxwell distribution     09c 2 N14 016 The Boltzmann distribution and Maxwell distribution.
maxwell's equations      11d 3 E03 013 Maxwell's tensor and Maxwell's equations.
mean                     09c 1 E13 043 Mean, median, mode.
measurement              11d 6 N38 008 Quantum Computing Measurement.
measuring                01    E03 010 Measuring angles.
median                   09c 1 E13 043 Mean, median, mode.
memory                   11    E37 022 Traffic memory.
memory                   11    N01 001 Memory: flipflop, feedback automata
mensuration              v   1 E06 029 Mensuration
metric                   11c 1 N09 029 The metric.
microarrays              11    E30 019 gene expression, microarrays
minimize                 08    N11 012 Minimize subject to constraint
minimizing               v   2 E11 019 Minimizing.
mobility                 09c 3 N25 016 Mobility, diffusivity and Brownian motion.
mode                     09c 1 E13 043 Mean, median, mode.
modular arithmetic       i     E50 030 Modular arithmetic and Euclid's algorithm.
modular arithmetic       iii   E29 018 Modular arithmetic.
modular powers           i     E53 035 Fermat and Euler on modular powers.
modulo arithmetic        04    E18 011 Field trip: modulo arithmetic, solving by radicals
moir\'e                  08c 2 E38 028 Periodic interactions, vernier, moir\'e
molecule                 08c 1 N13 012 Triangle molecule
molecules                08c 1 N12 010 Molecules: 1D
molecules                08c 4 E20 040 Molecules
moments                  09c 1 N04 007 Aggregates: the moments of distributions.
moments                  11d 5 E09 036 Even moments.
momentum                 07a   N04 002 Energy, momentum and frequency, wavenumber - Planck's const
momentum scales          11d 1 N03 004 Energy scales and momentum scales.
monatomic gases          09c 2 N19 039 State function for monatomic gases.
monotonic paths          ii    E34 023 Monotonic paths.
monty hall problem       09c 1 E63 082 Marilyn vos Savant on the Monty Hall problem.
multiplication           02    N05 003 Vector multiplication
multiplication           i     E41 025 Rectangular numbers> multiplication
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principal components an 08     E10 017 Factor analysis/Principal components analysis in the measur
probabilities           05     N04 002 Probabilities for Young's double slit
probability             10     E34 019 Sets and probability
product                 02     N10 008 product of functions, sum of arguments
product rule            08c 3 E22 029 Slope rules, product rule, chain rule
program                 11d 5 E25 038 Feynman's program Hamiltonian.
programming             11d 5 E03 034 Programming path integrals.
programming             12     N05 004 Recursion. Programming languages.
programming             i      N04 005 Rules and programming.
programming             v   1 N16 021 Programming the infinite series.
projection              02     N06 005 Polarizing filter as projection operator
projection              iv     E21 023 Projection and reflection.
projections             02     N07 005 Three projections
propagators             11d 5 N37 030 Propagators.
protor calculator       11c 1 N05 011 The protor calculator 1.
protor calculator       11c 1 N20 067 More protor calculator.
protors                 11c 1 N04 008 Protors.
pseudovectors           07c    N05 005 Twirl and area are '' pseudovectors" or ''axial vectors"
pythagoras              02     N09 007 two rotations, Pythagoras
pythagoras              v   2 E04 013 Pythagoras.
q-bits                  06     N08 004 Two q-bits
qed                     11d 5 N34 013 Diagrams and QED.
quadratic forms         08     E15 024 Quadratic forms and stability.
quantitative            01     E01 010 Quantitative thinking is important.
quantum                 01     E20 024 Quantum key distribution.
quantum computer        11d 6 N47 029 Building a quantum computer.
quantum computers       07b    N08 005 Physical construction of quantum computers
quantum computing       11d 6 N38 003 Quantum Computing.
quantum computing       11d 6 N38 004 Quantum Computing Binary gates.
quantum computing       11d 6 N38 008 Quantum Computing Measurement.
quantum computing       11d 6 N38 012 Quantum Computing Ternary gates.
quantum distributions   09c 1 N05 011 Quantum distributions
quantum field theory    11d 4 N30 045 Relativistic quantum field theory redux, so far.
quantum fields          11d 4 N18 001 Introduction to Quantum Fields.
quantum physics         01     E19 022 Can quantum physics be made more complete?
quantum physics         11d 4 E09 050 Can quantum physics be made more complete? (Part II).
quarks                  08c 4 N34 013 Isospin and quarks
quarks                  11d 3 E08 020 Quarks and vacuum.
quintic                 08c 1 E53 034 Symmetric field trip: Galois and the quintic
radians                 v   1 E09 031 Radians.
random graphs           09c 4 N30 003 Phase transitions in random graphs.
rationals               iii    N05 006 Rationals $< 1$.
realit                  11c 1 N02 002 '' Reality" and coordinates.
reasoning               i      N05 009 Reasoning with rules.
rectangles              i      N08 012 Multiplication: rectangles.
rectangular             i      E41 025 Rectangular numbers> multiplication
recursion               12     N01 001 Recursion. Define '' ancestor" in terms of ''parent".
recursion               12     N05 004 Recursion. Programming languages.
redshift                11c 2 N23 005 Gravitational redshift.
reflecting              08c 1 N05 003 Reflecting rotations, rotating reflections
reflection              07c    N08 008 Reflection
reflection              iv     E21 023 Projection and reflection.
reflections             08c 1 N02 002 Generating reflections
reflections             08c 1 N05 003 Reflecting rotations, rotating reflections
reflections             11d 4 E06 048 Sphere of reflections.
reflections             11d 4 E31 054 Hermitian transposes of reflections, etc.
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sieve of eratosthenes   i      E40 024 Sieve of Eratosthenes
simplex                 i      E08 017 Simplex numbers.
simplex                 i      E23 020 Simplexes> higher-dimensional triangles.
simplex                 iv     E24 028 Simplex arrays.
simplex coordinates     09c 1  E47 069 Simplex coordinates.
sin                     01     E08 012 Celtic knots and other fun with cos and sin.
sin                     01     E14 016 Useful cos and sin.
sin                     02     E02 009 values for cos, sin
sin                     04     N04 002 cos + sqrt(-1)sin as rotation
sine                    iv     E09 014 Cosine and sine.
sketchpad               08     N07 007 Sketchpad example 1 (linear constraint)
sketchpad               08     N08 008 Sketchpad example 2 (nonlinear constraint)
sketchpad example       08     N10 011 Underdetermined equations: Sketchpad example 3 (point colli
slope                   v   1  N20 027 Slope of $c$ and $s$.
slope                   v   2  N02 002 Slope.
slope                   v   2  N04 003 Slope of cubic.
slope absolute          11c 1  E37 090 Absolute slope and curvature.
slope absolute          11c 1  N15 046 Gradient, divergence and curl with absolute slope.
slope equations         v   1  N17 023 Slope equations.
slope equations         v   1  N21 028 Connecting with slope equations.
slope rules             08c 3  E22 029 Slope rules, product rule, chain rule
slope rules             08c 3  N30 013 Spherical harmonics, slope rules
slopes                  08     E28 027 Slopes of cos and sin.
slopes                  11c 1  E01 075 Slopes commute?
slopes                  11c 1  N01 001 Fields and slopes.
slopes                  11d 4  E33 055 Slopes of Clifford functions.
slopes                  11d 4  N28 035 Slopes and antislopes of 2D numbers, etc.
slopes                  i      E45 025 Slopes: division
slopes                  i      N09 012 Division: slopes.
slopes                  v   1  N08 007 Slopes.
slopes                  v   1  N09 010 Slopes of curves.
slopes absolute         11c 1  N14 043 Absolute slopes.
small numbers           ii     N09 014 Really small numbers.
solving by radicals     04     E18 011 Field trip: modulo arithmetic, solving by radicals
source vector           08     N03 003 Add equal columns of small numbers as source vector
special relativity      03     N11 010 Physical principles behind special relativity.
speed                   03     N02 001 speed
spherical group         08c 3  N29 007 Representations of the spherical group.
spherical harmonics     08c 3  N30 013 Spherical harmonics, slope rules
spherical symmetry      08c 3  N27 004 Spherical symmetry.
spin                    07c    E40 038 Spin and Clifford Algebra.
spin                    11d 4  N21 014 Spin.
spin 2                  06     E12 010 Spin 2.
spin 3/2                06     E11 008 Spin 3/2.
spin statistics         07a    E11 012 Spin statistics, etc.
spin-1                  06     N10 005 Spin-1 and polarized light
spinors                 11d 4  N22 018 Vectors and spinors.
spring constants        08c 1  E37 031 Spring constants.
square roots            i      N06 010 Square roots and cube roots
square roots            v   1  N13 016 Square roots.
square roots            v   2  N06 004 Square roots.
squares                 i      E06 017 Squares.
squares                 i      E24 020 Hypercubes: higher-dimensional squares.
squares                 i      E25 021 Hyperdipyramids: higher-dimensional squares, part 2.
stability               08     E15 024 Quadratic forms and stability.
stability               11d 2  E04 024 Stability of numerical solutions of the wave equation.
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stars                    01      E15 017 Trigonometry can help us locate the stars.
state function           09c 2 N19 039 State function for monatomic gases.
state space              07b     N06 004 State space and entanglement
states                   06      N01 001  States.
states                   06      N01 001 Two polarization states of light
states                   06      N02 001 Two polarization states of electrons
stationary action        08c 4 N37 020 Principle of Stationary Action.
statistics               09c 2 N13 011 A gas simulation 2: statistics.
stoichiometry            08      E14 021 Null spaces and stoichiometry.
straight lines           05      N07 005 Light travels in straight lines
su(2)                    08c 4 N32 002 SU(2) formal and informal.
su(3)                    08c 4 N33 006 SU(3).
sublimation              09c 4 N33 016 Sublimation.
sum                      02      N10 008 product of functions, sum of arguments
sums                     i       N01 001 Rules and sums.
surface integrals        11c 1 E14 077 Gauss' law for volume integrals and surface integrals
surprise                 09c 1 N07 021 Expectation, surprise and ignorance.
surveying                08      E38 032 Surveying
swap gate                11d 6 E07 033 Implement swap gate.
switch-light             07b     N04 003 Classical circuit for switch-light
switch-light             07b     N05 003 Quantum circuit for switch-light
switch-light question    07b     N02 001 Switch-light question needs 1 function call
switching circuits       10      N05 005 Switching circuits: halfadder, fulladder
symbol system            09c 1 E62 081 Order of a symbol system.
symmetric polynomials    04      E22 014 '' Symmetric polynomials".
symmetric states         06      N09 004 Symmetric states and antisymmetric states
symmetries               11d 3 E06 014 Abelian and non-Abelian symmetries.
symmetries               11d 3 N17 009 Other symmetries, other forces.
symmetry                 v   1 N04 004 Symmetry.
symmetry                 v   1 N07 006 Symmetry, again.
symmetry and conservati  08c 4 N35 016 Symmetry and Conservation: Complementary Quantities
symmetry and conservati  08c 4 N36 017 Symmetry and Conservation: Energy
symmetry and conservati  08c 4 N38 028 Symmetry and Conservation: Noether's Theorem
tachyons                 09      E25 033 Tachyons faster than light
temperature              09c 2 N17 029 Temperature.
tensor                   07c     E32 020 Nonorthogonal axes and tensor notation.
tensor                   07c     N04 004 Is twirl a tensor?
tensor                   11c 1 N19 065 The Ricci tensor.
tensor                   11d 3 E03 013 Maxwell's tensor and Maxwell's equations.
tensor calculator        07c     E33 024 Tensor Calculator I. Matrix representation.
tensor calculator        07c     E34 026 Tensor Calculator I. Relational representation.
tensor curvature         11c 1 E40 092 Number of components of the curvature tensor.
tensor product           11d 4 E07 049 Density matrices and inverse tensor product.
tensor product           11d 4 E26 054 Tensor product transposes.
tensor products          11d 4 N20 011 Tensor products.
tensors                  11c 1 E23 081 Levi-Civita symbol, alternating tensors.
tensors                  11c 1 E24 083 Physical tensors.
tensors                  11c 1 N03 005 Index notation and tensors.
ternary gates            11d 6 N38 012 Quantum Computing Ternary gates.
tetrahedron              07c     E16 015 Tetrahedron.
tetrahedron              08c 1 N16 019 Tetrahedron.
theories                 01      N11 009 Algorithm for scientific theories.
theory                   01      N03 003 Theory
theory                   01      N06 005 Theory predicts
theory                   01      N07 007 Theory predicts wrong?
theory                   01      N09 008 Testing theory
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theory                    01     N10 008 Theory fixed
thermostat                11     N02 005 Control: thermostat
thermostatic              09c 2 N20 044 Thermostatic equations of state.
thongs                    09c 1 E61 080 Thongs.
three-dimensional rotat iv     E11 017 Three-dimensional rotations.
through the earth         11c 1 E15 077 Message through the Earth.
throwing balls            v   2 E01 011 Throwing balls
tides                     11c 2 N28 026 Tides.
time                      03     N01 001 time and distance
time dilation             03     E18 012 time dilation
timespace                 03     N03 001 timespace, Galileo, Stan and Trav
timespace                 11c 2 N22 002 Curved timespace.
timespace                 iv     E16 019 Velocities in timespace.
tipping point             11     E29 019 tipping point
total turtle turning      04     N10 004 Turtle graphics. Total Turtle Turning
trace                     08c 1 N08 005 Matrix invariant sets share eigenvalues, determinant, trace
traces                    08c 1 N10 007 Using traces to block-diagonalize a whole matrix representa
traffic                   11     E37 022 Traffic memory.
traffic lights            11c 1 E16 079 Falling traffic lights
transformation matrix     06     N03 002 Euler angles, transformation matrix
transforming              06     N07 004 Transforming amplitudes
transforming space        iv     N07 006 Transforming space.
treasure island           04     E05 007 Treasure Island
trees                     ii     E40 024 Factorial trees.
trees                     ii     E41 024 Choose trees.
trees                     ii     E42 025 Ways trees.
trees                     ii     N02 001 Trees
trees                     ii     N03 003 Inverting trees.
triangle symmetry         08c 1 N01 001 Triangle symmetry
triangles                 01     E06 011 (Trig. and triangles)
triangles                 i      E23 020 Simplexes> higher-dimensional triangles.
trig.                     01     E06 011 (Trig. and triangles)
trigonometry              01     E15 017 Trigonometry can help us locate the stars.
trigonometry              05     N06 004 Trigonometry for double slit
trisect                   04     E16 011 ruler and compass cannot trisect angles
trivial                   08c 1 N09 006 Other representations: trivial, direct, permutation
truth                     i      E01 016 Mathematical truth
turing machine            11     E48 025 Turing machine
turtle graphics           04     N10 004 Turtle graphics. Total Turtle Turning
two-dimensional numbers v   1 N19 026 Two-dimensional numbers.
uncertainty               11d 4 E02 046 Heisenberg uncertainty.
uncertainty               11d 4 E03 046 More uncertainty.
uncertainty principle     09     N07 010 The Uncertainty Principle
underdetermined equatio 08     N10 011 Underdetermined equations: Sketchpad example 3 (point colli
vacuum                    11d 3 E08 020 Quarks and vacuum.
van der waals             09c 4 N32 012 Van der Waals.
variations                09c 2 N15 021 Fluctuations, variations and samples.
vector                    02     N02 002 Light beam as vector
vector                    02     N05 003 Vector multiplication
vector                    04     N05 002 x + sqrt(-1)y as vector
vector                    07c    N13 013 Appendix: Summary of vector and matrix operations
vector                    09     E18 017 Fourier Transform with vector $k,\ell$.
vector space              09     N01 001 2D numbers give 5D vector space
vectors                   07c    N01 001 Vectors are real.
vectors                   07c    N02 002 Some pairs are not vectors
vectors                   07c    N06 006 Vectors and Areas and .. All Together
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vectors              11d 4 N22 018 Vectors and spinors.
vectors              iv    N02 002 Vectors.
vectors              iv    N05 004 Vectors in space.
velocities           iv    E16 019 Velocities in timespace.
vernier              08c 2 E38 028 Periodic interactions, vernier, moir\'e
viscosity            09c 3 E24 037 Viscosity and heat conduction.
viscosity            09c 3 E25 041 `` Ohm's law" for viscosity.
viscosity            09c 3 E26 041 Elasticity and viscosity
visualizations       i     N02 003 Some visualizations.
visualizing          07a   E02 010 Visualizing waves
visualizing          11d 1 E09 022 Visualizing magnetic fields.
volume integrals     11c 1 E14 077 Gauss' law for volume integrals and surface integrals
volumes              v   2 N09 008 Volumes.
wallpaper groups     08c 2 E23 026 Wallpaper groups.
wallpaper groups     08c 2 N25 016 Wallpaper groups.
warp drives          11c 2 E28 053 Negative energy: warp drives.
wave equation        11d 2 E04 024 Stability of numerical solutions of the wave equation.
wave equation        11d 2 N09 007 The Wave Equation.
wavelength           05    N05 003 Wavelength
wavenumber           07a   N04 002 Energy, momentum and frequency, wavenumber - Planck's const
wavepacket           11d 3 N14 003 Simulating a charged wavepacket moving near a current.
waves                07a   E01 010 Waves
waves                07a   E02 010 Visualizing waves
waves                08c 2 N22 011 2D waves
ways                 ii    E42 025 Ways trees.
work                 09c 2 N22 052 Work and heat.
x^2 - x - 1 = 0      v   1 N01 001 Solving $ x^2 - x - 1 = 0 $
x^2 - x - 1 = 0      v   1 N02 001 Picture of $ x^2 - x - 1 = 0 $
xor                  10    E53 024 {\bf xor} and {\bf and}.
yukawa potential     11d 4 N25 028 The Yukawa potential.
z-order              iii   E14 015 Z-order
zeno                 ii    E38 024 (Zeno's dichotomy paradox.)
zeros                v   1 N06 006 Zeros of a function.
zeros                v   1 N12 015 Back to the zeros of $\frac52x^2 - \frac12x - 2$.
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