Index

A
absolute extremum, 119
acceleration
tangential component, 345
tangent component, 345
acceleration vector, 345
algebraic precedence, 507
alternating harmonic series, 273
anti-parallel vectors, 309
antiderivative, 155
area
between curves, 191
under a curve, 421
under curve, 151
asymptote, 23, 115
average, 405
average height, 385
C
Cauchy Principal Value, 220
center of mass, 405
center of mass, 215
centroid, 216, 402
chain rule, 67
characteristic polynomial, 470
chord, 32
circle
area, 507
circumference, 507
equation of, 21, 508
unit, 21
Clairaut’s Theorem, 372
closed paths, 427
completing the square, 507
composition of functions, 27, 45, 67
concave down, 114
concave up, 114
cone
lateral area, 508
surface area, 508
volume, 508
conservative vector field, 426
continuous, 55, 355
convergent sequence, 259
convergent series, 264
cartesian coordinates, 241, 323
Cartesian coordinates, 241, 323
cosines
law of, 307, 508
critical value, 108
cross product, 313
cumulative distribution function, 226
curvature, 342
curvature formula, 342, 343
curve sketching, 107
cycloid, 251
cylinder
lateral area, 508
surface area, 508
volume, 508
cylindrical coordinates, 407
cylindrical coordinates, 323
D
definite integral, 159
del (\nabla), 367
dependent variable, 24
derivative, 34, 48
dot notation, 132
Leibniz notation, 49
second, 112, 113
difference quotient, 32
differentiable, 55, 362
differential, 144
differential equation, 455
first order, 456
particular solution, 458
separable, 458
directional derivative, 367
discrete probability, 223
discriminant, 373
displacement vector, 303
divergence test, 266
Divergence Theorem, 450
divergent sequence, 259
divergent series, 264
domain, 21
dot notation, 132
dot product, 308
double integral, 386
E
equation of, 508
ellipsoid, 238
error estimate, 185
error function, 85
expected value, 224
exponential function, 82
Extreme Value Theorem, 121
F
Fermat’s Theorem, 108
flux, 443
frustum, 235
Fubini’s Theorem, 389
generation, 22
global extremum, 119
greatest integer, 110
greatest integer, 110
harmonic series, 267
alternating, 273
hyperbolic cosine, 102
hyperbolic sine, 102
hypocycloid, 252
hypocycloid, 252
I
improper integral, 219
incompressible, 436
indefinite integral, 159
incompressible, 436
indefinite integral, 159
dependent variable, 24
inflection point, 114
initial condition, 456
initial value problem
first order, 456
integral
improper, 219
indefinite, 159
of sec^2 x, 175
properties of, 163
integral sign, 155
integration
by parts, 176
Intermediate Value Theorem, 55
interval of convergence, 284
inverse function, 82
inverse sine, 94
involute, 252
J
Jacobian, 416
judicious guessing, 473
K
kinetic energy, 221
L
L'Hôpital's Rule, 98
Lagrange multipliers, 378
lateral area of a cone, 130
law of cosines, 307, 508
law of sines, 508
Leibniz notation, 49
level curve, 351
level set, 352
level surface, 352
limit, 41
limit at infinity, 98
limit of a sequence, 259
line integral, 421
linear approximation, 143
linearity of the derivative, 60
local extremum, 107
local maximum, 107
local minimum, 107
logarithm, 82
logarithmic function, 82
logistic equation, 460
long division of polynomials, 182
M
Maclaurin series, 288
mass, 405
mean, 224, 227
Mean Value Theorem, 146
moment, 215, 400, 406
N
Newton, 210
Newton's law of cooling, 455
Newton's method, 139-141
normal, 317, 344
normal distribution, 232
O
one sided limit, 46
optimization, 119
orientable surface, 444
oriented curve, 429
P
p-series, 270
parallel vectors, 309
parallelogram
and vector sum, 303
area of, 315, 402, 414
parametric equations, 250, 320, 330
partial fractions, 180
particular solution, 458
physicists, 132
point-slope formula, 508
polar coordinates, 241, 323
polynomial
of two variables, 356
power function, 57
power rule, 57, 89, 92
precedence
of algebraic operations, 507
probability density function, 225
product rule, 62, 63
generalized, 64
projection, 423
scalar, 423
projection of a vector, 309
properties of integrals, 163
Q
quadratic formula, 507
quotient rule, 64
R
radian measure, 73
radius of convergence, 284
random variable, 224
rational function, 66, 180
rectangular coordinates, 241, 323
related rates, 131
resonant frequency, 477
right hand rule, 316
Rolle's Theorem, 146
S
scalar multiplication, 304
scalar projection, 423
second derivative, 112, 113
separation of variables, 458
sequence, 258
bounded, 262
bounded above, 262
bounded below, 262
convergent, 259
decreasing, 262
divergent, 259
increasing, 262
monotonic, 262
non-decreasing, 262
non-increasing, 262
of partial sums, 264
series, 258
p-series, 270
absolute convergence, 278
alternating harmonic, 273
conditional convergence, 278
convergent, 264
divergent, 264
geometric, 264
harmonic, 267
integral test, 270
interval of convergence, 284
Maclaurin, 288
radius of convergence, 284
Taylor, 290
Simpson's Rule, 187
sines
law of, 508
slope field, 468
sphere
surface area, 508
volume, 508
spherical coordinates, 325, 407
spiral of Archimedes, 243
squeeze theorem, 77
standard deviation, 229
standard normal distribution, 227
standard normal probability density function, 226
steady state part of solution to d.e., 476
substitution, 411
subtend, 74
sum
of vectors, 303
sum rule, 61
surface area, 492
T
tangent line, 32
Taylor series, 290
Toricelli’s trumpet, 223, 238
torque, 213
torus, 238
transcendental function, 73
transient part of solution to d.e., 476
Trapezoid Rule, 185
triangle inequality, 43, 302
trigonometric identities, 508
U
unbounded function, 54
undetermined coefficients, 473
uniform distribution, 226
uniform probability density function, 226
unit binormal, 344
unit circle, 21
unit normal, 344
unit vector, 310, 336
V
variance, 229
variation of parameters, 463, 477
vector, 302
anti-parallel, 309
cross product, 313
displacement, 303
function, 330
normal to a plane, 317
parallel, 309
projection, 309
scalar multiplication, 304
sum, 303
unit, 310
vector fields, 419
velocity, 37
velocity vector, 345

W

witch of Agnesi, 66
work, 209