

Index

A

absolute extremum, 101
algebraic precedence, 325
alternating harmonic series, 283
antiderivative, 137
arc length, 242
arccosine, 195
arcsine, 194
area
 between curves, 153
 under curve, 133
asymptote, 21, 98

B

bell curve, 236
bounded function, 51

C

cardioid, 252
Cartesian coordinates, 251
Cauchy Principal Value, 230
center of mass, 225
centroid, 226
chain rule, 65
chord, 30
circle
 area, 325
 circumference, 325
 equation of, 19, 326
 unit, 19

completing the square, 325
composition of functions, 25, 43, 65
concave down, 96
concave up, 96
cone
 lateral area, 326
 surface area, 326
 volume, 326
continuous, 53
convergent sequence, 269
convergent series, 274
coordinates
 Cartesian, 251
 converting rectangular to polar, 252
 polar, 251
 rectangular, 251
cosines
 law of, 326
critical point, 90
critical value, 90
cumulative distribution function, 236
curve sketching, 89
cycloid, 261
cylinder
 lateral area, 326
 surface area, 326
 volume, 326

D

definite integral, 141
dependent variable, 22
derivative, 32, 46

330 Index

dot notation, 114
Leibniz notation, 47
second, 95, 96
difference quotient, 30
differentiable, 53
differential, 126
discrete probability, 233
divergence test, 276
divergent sequence, 269
divergent series, 274
domain, 21
dot notation, 114

E

ellipse
 area, 325
 equation of, 326
ellipsoid, 249
error estimate, 217
escape velocity, 232
expected value, 234
exponential distribution, 237
Extreme Value Theorem, 103

F

Fermat's Theorem, 90
frustum, 245
function, 20
 bounded, 51
 differentiable, 53
 implicit, 80
 linear, 20
 rational, 212
 unbounded, 52
function composition, 25
Fundamental Theorem of Algebra, 93
Fundamental Theorem of Calculus, 135

G

Gabriel's horn, 233, 248
geometric series, 274
global extremum, 101
greatest integer, 93

H

harmonic series, 277
 alternating, 283
Hooke's Law, 173

hyperbolic cosine, 197
hyperbolic sine, 197
hypercyclid, 262
hypocyclid, 262

I

implicit differentiation, 80
implicit function, 80
improper integral, 229
 convergent, 229
 diverges, 229
indefinite integral, 141
independent variable, 22
inflection point, 97
integral
 improper, 229
 indefinite, 141
 of $\sec x$, 207
 of $\sec^3 x$, 207
 properties of, 145
integral sign, 137
integral test, 280
integration
 by parts, 208
Intermediate Value Theorem, 53
interval of convergence, 294
inverse sine, 194
involute, 262

K

kinetic energy, 231

L

L'Hôpital's Rule, 86
lateral area of a cone, 112
law of cosines, 326
law of sines, 326
Leibniz notation, 47
limit, 39
limit at infinity, 85
limit of a sequence, 269
linear approximation, 125
linearity of the derivative, 58
local extremum, 89
local maximum, 89
local minimum, 89
long division of polynomials, 214

M

Maclaurin series, 298

mean, 234, 237
 Mean Value Theorem, 128
 moment, 225

N

Napier's constant, 186
 Newton, 172
 Newton's method, 121–123
 normal distribution, 242

O

one sided limit, 44
 optimization, 101

P

p-series, 280
 parametric equations, 260
 partial fractions, 212
 physicists, 114
 point-slope formula, 326
 polar coordinates, 251
 power function, 55
 power rule, 55
 precedence
 of algebraic operations, 325
 probability density function, 235
 product rule, 60, 61
 generalized, 62
 properties of integrals, 145

Q

quadratic formula, 325
 quotient rule, 62

R

radian measure, 71
 radius of convergence, 294
 random variable, 234
 rational function, 64, 212
 rectangular coordinates, 251
 related rates, 113
 Rolle's Theorem, 128

S

second derivative, 95, 96
 sequence, 268

bounded, 272
 bounded above, 272
 bounded below, 272
 convergent, 269
 decreasing, 272
 divergent, 269
 increasing, 272
 monotonic, 272
 non-decreasing, 272
 non-increasing, 272
 of partial sums, 274
 series, 268
p-series, 280
 absolute convergence, 288
 alternating harmonic, 283
 conditional convergence, 288
 convergent, 274
 divergent, 274
 geometric, 274
 harmonic, 277
 integral test, 280
 interval of convergence, 294
 Maclaurin, 298
 radius of convergence, 294
 Taylor, 300
 Simpson's Rule, 219
 sines
 law of, 326
 sphere
 surface area, 326
 volume, 326
 spiral of Archimedes, 253
 squeeze theorem, 75
 standard deviation, 239
 standard normal distribution, 237
 standard normal probability density
 function, 236
 subtend, 72
 sum rule, 59

T

tangent line, 30
 Taylor series, 300
 Toricelli's trumpet, 233, 248
 torque, 223
 torus, 248
 transcendental function, 71
 transcendental number, 186
 Trapezoid Rule, 217
 triangle inequality, 41
 trigonometric identities, 326

U

unbounded function, 52
 uniform distribution, 236
 uniform probability density function, 236
 unit circle, 19

V

variance, 239
 velocity, 35

W

witch of Agnesi, 64
 work, 171