

Index

• A •

- absolute maximum and minimum, 66–67, 290–293
- absolute value equations, 11, 142–143
- absolute value inequalities, 12, 150
- acceleration, 85–86, 382–386
- adding polynomials, 14, 159
- algebra
 - absolute value equations, 11, 142–143
 - absolute value inequalities, 12, 150
 - adding polynomials, 14, 159
 - domain and range of a function and its inverse, 10, 137–138
 - end behavior of polynomials, 14, 158–159
 - finding domain and range from graphs, 13–14, 157–158
 - graphing common functions, 12–13, 150–157
 - horizontal line test, 9, 133–134
 - linear equations, 10, 138–139
 - long division of polynomials, 15, 162–163
 - multiplying polynomials, 15, 161
 - polynomial inequalities, 12, 145–149
 - problem types, 7
 - quadratic equations, 10–11, 139–141
 - rational inequalities, 12, 145–149
 - simplifying
 - fractions, 8, 127–131
 - radicals, 8–9, 131–133
 - solving
 - polynomial equations by factoring, 11, 141–142
 - rational equations, 11, 144–145
 - subtracting polynomials, 14–15, 160
 - tips for, 7
- amplitude, 23, 177
- angles, finding in coordinate plane, 19–20, 168
- answers to practice problems. *See specific topics*
- antiderivatives. *See also* Riemann sums
 - examples of, 81–84, 365–375
 - of hyperbolic functions, 102–103, 485–489
 - involving inverse trigonometric functions, 101, 475–481
- applications of derivatives
 - applying Rolle’s theorem, 69, 311–313
 - approximating roots using Newton’s method, 73, 335–338
 - closed interval method for finding maximum and minimum, 67, 291–293
 - determining concavity, 68–69, 300–303
 - estimating values with linearizations, 64, 233–234, 236–237, 279–283
 - evaluating differentials, 64, 278
 - finding
 - absolute maximum and minimum with closed intervals, 67, 291–293
 - intervals of increase and decrease, 68, 293–296
 - local maxima and minima using first derivative test, 68, 296–300
 - local maxima and minima using second derivative test, 69, 307–311
 - maxima and minima from graphs, 66–67, 290–291
 - speed, 70–71, 318–321
 - velocity, 70–71, 318–321
 - identifying inflection points, 69, 303–307
 - optimization problems, 71–72, 321–335
 - problem types, 63
 - related rates, 64–66, 283–290
 - relating velocity and position, 70, 316–318
 - solving problems with mean value theorem, 70, 313–316
 - tips for, 63
- approximating roots using Newton’s method, 73, 335–338
- area. *See* Riemann sums
- area between curves, 88–89, 387–406
- average value of functions, 97–98, 463–470

• C •

- Calculus For Dummies* (Ryan), 3
- Calculus II For Dummies* (Zegarelli), 3
- chain rule, 49, 52–54, 248–256
- Cheat Sheet (website), 2
- classifying discontinuities, 38–40, 218–221
- closed interval method, 67, 291–293
- coefficients, 117–118, 557–560
- comparison test, 123, 589–591
- concavity, 68–69, 300–303
- continuity, 39–40, 219–224

continuous functions, 40
 convergent improper integrals, 122–123,
 573–589
 coordinate plane, finding angles in, 19–20, 168
 cross-sectional slices, finding volume using, 91,
 422–429
 cylindrical shells, finding volume using, 92–93,
 429–448

• D •

decomposition, partial fraction,
 117–118, 557–560
 definite integrals. *See also* applications of
 derivatives
 determining differentiability
 from graphs, 44, 226
 evaluating using limits and Riemann sums, 78,
 350–353
 examples of, 80–81, 361–365
 finding
 area between curves, 88–89, 387–406
 average value of functions, 97–98, 463–470
 expressions of definite integrals using limits
 and Riemann sums, 77, 346–348
 with fundamental theorem of calculus, 80,
 354–361
 graph points, 48, 236–237
 of hyperbolic functions, 102, 485–489
 involving exponential functions, 57, 262–265
 involving inverse trigonometric functions,
 100, 471–475
 from limit and Riemann sum form, 78,
 348–350
 with power rule, 47–48, 234–236
 using chain rule, 52–54, 248–256
 by using definition, 45, 226–233
 using implicit differentiation, 60, 268–271
 using logarithmic differentiation, 56, 260–262
 using product rule, 50–51, 237–242
 using quotient rule, 51–52, 242–248
 value of definite integrals using graphs,
 46–47, 233–234
 volume using cross-sectional slices, 91,
 422–429
 volume using cylindrical shells, 92–93,
 429–448
 volumes using disks and washers, 89–91,
 406–421
 involving logarithmic functions, 56, 256–260
 problem types, 43, 87
 tips for, 43, 87
 work, 94–97

definitions, evaluating hyperbolic functions
 using, 101–102, 482–483
 degree measure, 18–19, 166–167
 derivatives. *See also* applications of derivatives
 determining differentiability from graphs,
 44, 226
 evaluating using limits and Riemann sums, 78,
 350–353
 examples of, 80–81, 361–365
 finding
 area between curves, 88–89, 387–406
 average value of functions, 97–98, 463–470
 expressions of derivatives using limits and
 Riemann sums, 77, 346–348
 with fundamental theorem of calculus, 80,
 354–361
 graph points, 48, 236–237
 of hyperbolic functions, 102, 485–489
 involving exponential functions, 57, 262–265
 involving inverse trigonometric functions,
 100, 471–475
 from limit and Riemann sum form, 78,
 348–350
 with power rule, 47–48, 234–236
 using chain rule, 52–54, 248–256
 by using definition, 45, 226–233
 using implicit differentiation, 60, 268–271
 using logarithmic differentiation, 56, 260–262
 using product rule, 50–51, 237–242
 using quotient rule, 51–52, 242–248
 value of using graphs, 46–47, 233–234
 volume using cross-sectional slices, 91,
 422–429
 volume using cylindrical shells, 92–93,
 429–448
 volumes using disks and washers, 89–91,
 406–421
 involving logarithmic functions, 56, 256–260
 problem types, 43, 87
 tips for, 43, 87
 work, 94–97
 differentiability determining from graphs,
 44, 226
 differentials, evaluating, 64, 278
 discontinuities, classifying, 38–40, 218–221
 displacement, 85–86, 377–379, 382–383
 distance traveled, finding for particles, 85–86,
 379–381, 384–386
 divergent improper integrals, 122–123, 573–589
 domain
 finding from graphs, 13–14, 157–158
 of a function and its inverse, 10, 137–138
 Dummies (website), 3

● **E** ●

end behavior of polynomials, 14, 158–159
 equations
 absolute value, 11, 142–143
 finding
 of normal lines, 58, 266–268
 of tangent lines, 57, 265–266
 of tangent lines using implicit differentiation, 61, 274–277
 linear, 10, 138–139
 of periodic functions, 23–26, 178–179
 polynomial, 11, 141–142
 quadratic, 10–11, 139–141
 rational, 11, 144–145
 trigonometric, 22–23, 26–27, 173–176, 182–185
 estimating values with linearizations, 64, 233–234, 236–237, 279–283
 evaluating
 definite integrals using limits and Riemann sums, 78
 differentials, 64, 278
 hyperbolic functions using definitions, 101–102, 482–483
 indeterminate forms using L'Hôpital's rule, 103–105, 489–502
 limits, 31–32, 186–196
 trigonometric limits, 33, 198–202
 exponential functions, 55, 57, 262–265
 exponents, writing using radical notation, 9, 133

● **F** ●

factoring, 11, 141–142
 finding. *See also* solving
 angles in coordinate plane, 19–20, 168
 antiderivatives
 of hyperbolic functions, 102–103, 485–489
 involving inverse trigonometric functions, 101, 475–481
 common trigonometric values, 21, 168–170
 derivatives
 with chain rule, 52–54, 248–256
 with fundamental theorem of calculus, 80, 354–361
 of hyperbolic functions, 102, 485–489
 involving exponential functions, 57, 262–265
 involving inverse trigonometric functions, 100, 471–475

 with power rule, 47–48, 234–236
 by using definition, 45, 226–233
 using implicit differentiation, 60, 268–271
 using logarithmic differentiation, 56, 260–262
 using product rule, 50–51, 237–242
 using quotient rule, 51–52, 242–248
 domain and range of a function and its inverse, 10, 137–138
 domain from graphs, 13–14, 157–158
 equations
 of normal lines, 58, 266–268
 of tangent lines, 57, 265–266
 of tangent lines using implicit differentiation, 61, 274–277
 graph points, 48, 236–237
 intervals of increase and decrease, 68, 293–296
 inverses, 9–10, 135–137
 limits from graphs, 30–31, 186
 linearizations, 64, 233–234, 236–237, 279–283
 local maxima/minima
 using first derivative test, 68, 296–300
 using second derivative test, 69, 307–311
 maxima from graphs, 66–67, 290–291
 minima from graphs, 66–67, 290–291
 partial fraction decomposition, 117–118, 557–560
 range from graphs, 13–14, 157–158
 speed, 70–71, 318–321
 value of derivatives using graphs, 46–47, 233–234
 velocity, 70–71, 318–321
 volume
 using cross-sectional slices, 91, 422–429
 using cylindrical shells, 92–93, 429–448
 volume using disks and washers, 89–91, 406–421
 first derivative test, finding local maxima/minima using, 68, 296–300
 fractions, simplifying, 8, 127–131
 functions
 average value of, 97–98, 463–470
 continuous, 40
 exponential, 55, 57, 262–265
 finding domain of, 10, 137–138
 finding range of, 10, 137–138
 graphing, 12–13, 137–138, 150–157, 222–223, 223–224, 262–265
 hyperbolic
 evaluating using definitions, 101–102, 482–483
 finding antiderivatives of, 102–103, 485–489

functions (*continued*)

- finding derivatives of, 102, 485–489
 - problem types, 99
 - tips for, 99
 - inverse trigonometric
 - about, 26
 - finding antiderivatives using, 101, 475–481
 - finding derivatives involving, 100, 471–475
 - problem types, 99
 - tips for, 99
 - logarithmic, 55, 56, 256–260
 - making continuous, 40
 - periodic, 23–26, 178–179
- ## fundamental theorem of calculus
- definite integrals, 80–81, 361–365
 - displacement of particles, 85–86, 377–379, 382–386
 - distance traveled by particles, 85–86, 377–379, 382–386
 - finding derivatives with, 80, 354–361
 - indefinite integrals, 81–84, 365–375
 - problem types, 79
 - tips for, 79

• G •

graphs and graphing

- common functions, 12–13, 150–157
- determining differentiability from, 44, 226
- finding
 - domain from, 13–14, 157–158
 - limits from, 30–31, 186
 - maxima and minima from, 66–67, 290–291
 - points, 48, 236–237
 - range from, 13–14, 157–158
 - value of derivatives using graphs, 46–47, 233–234
- limits from, 36–37, 207–208

• H •

- horizontal asymptotes, 38, 215–218
- horizontal line test, 9, 133–134
- hyperbolic functions
 - antiderivatives of, 102–103, 485–489
 - derivatives of, 102, 485–489
 - evaluating using definitions, 101–102, 482–483
 - problem types, 99
 - tips for, 99

• I •

- identifying inflection points, 69, 303–307
- implicit differentiation
 - finding derivatives using, 60, 268–271
 - finding equations of tangent lines using, 61, 274–277
 - problem types, 59
 - tips for, 59
- improper integrals
 - comparison test, 123, 589–591
 - convergent, 122–123, 573–589
 - defined, 121
 - divergent, 122–123, 573–589
 - problem types, 121
 - Simpson's rule, 124, 592–593
 - tips for, 121
 - trapezoid rule, 124, 591–592
- indefinite integrals. *See also* Riemann sums
 - examples of, 81–84, 365–375
 - of hyperbolic functions, 102–103, 485–489
 - involving inverse trigonometric functions, 101, 475–481
- indeterminate forms, evaluating using
 - L'Hôpital's Rule, 103–105, 489–502
- inequalities
 - absolute value, 12, 150
 - polynomial, 12, 145–149
 - rational, 12, 145–149
- infinite limits, 33–37, 202–214
- inflection points, identifying, 69, 303–307
- integrals. *See also* definite integrals; indefinite integrals
 - convergent improper, 122–123, 573–589
 - divergent improper, 122–123, 573–589
 - improper
 - comparison test, 123, 589–591
 - convergent, 122–123, 573–589
 - defined, 121
 - divergent, 122–123, 573–589
 - problem types, 121
 - Simpson's rule, 124, 592–593
 - tips for, 121
 - trapezoid rule, 124, 591–592
 - involving partial fractions, 118–119, 561–569, 589–591
 - trigonometric, 113, 114–116, 524–537
- integration, 107, 109–111, 512–524. *See also* *u*-substitution
- intermediate value theorem, 41, 224–225

intervals of increase/decrease, 68, 293–296

inverse trigonometric functions

about, 26

finding

antiderivatives using, 101, 475–481

derivatives involving, 100, 471–475

problem types, 99

tips for, 99

inverses

finding, 9–10, 135–137

solving trigonometric equations using, 26–27, 182–185

• K •

Kase, Elleyne (author)

Pre-Calculus For Dummies, 3

Kuang, Yuang (author)

Pre-Calculus For Dummies, 3

• L •

left endpoints, calculating Riemann sums with, 76, 338–340

L'Hôpital's rule, 103–105, 489–502

limits

applying the squeeze theorem, 32–33, 196–198

classifying discontinuities, 38–40, 218–221

continuity, 39–40

discontinuities, 39–40

evaluating, 31–32, 186–196

evaluating definite integrals using, 78, 350–353

finding expressions for definite integrals with, 77, 346–348

from graphs, 30–31, 36–37, 186, 207–208

horizontal asymptotes, 38, 215–218

infinite, 33–37, 202–214

intermediate value theorem, 41, 224–225

tips for, 29

trigonometric, 33, 198–202

types of problems, 29

linear equations, 10, 138–139

linearizations, estimating values with, 63, 233–234, 236–237, 279–283

local maxima/minima, 68, 296–300, 307–311

logarithmic differentiation, finding derivatives using, 56, 260–262

logarithmic functions, derivatives involving, 55, 56, 256–260

long division of polynomials, 15, 162–163

• M •

maxima and minima

closed interval method, 67, 291–293

first derivative test, 68, 296–300

from graphs, 66–67, 290–291

optimization problems, 71–72, 321–335

second derivative test, 69, 307–311

mean value theorem, solving problems with, 70, 313–316

midline, 23, 177

midpoints, calculating Riemann sums with, 77, 343–345

multiplying polynomials, 15, 161

• N •

net change theorem, 84–85, 375–377

Newton's method, approximating roots using, 73, 335–338

normal lines, finding equations of, 58, 266–268

• O •

online practice, registering for, 2

optimization problems, solving, 71–72, 321–335

• P •

partial fractions

decomposition, 117–118, 557–560

integrals involving, 118–119, 561–569, 589–591

problem types, 113

tips for, 114

period, 23, 177

periodic functions, equations of, 23–26, 178–179

phase shift, 23, 177

polynomial equations, solving by factoring, 11, 141–142

polynomial inequalities, 12, 145–149

polynomials

adding, 14, 159

end behavior of, 14, 158–159

long division of, 15, 162–163

multiplying, 15, 161

subtracting, 14–15, 160

position, relating with velocity, 70, 316–318

power rule, finding derivatives with, 47–48, 234–236

practice, online, 2

practice problems. *See specific topics*

Pre-Calculus For Dummies (Kuang and Kase), 3

product rule, finding derivatives with, 49, 50–51, 237–242

• Q •

quadratic equations, 10–11, 139–141

quotient rule, finding derivatives with, 49, 51–52, 242–248

• R •

radian measure, 18–19, 166–167

radicals, simplifying, 8–9, 131–133

range

finding from graphs, 13–14, 157–158

finding of a function, 10, 137–138

rates of change. *See also* derivatives

acceleration and velocity, 85–86, 382–386

related rates problems, 64–66, 283–290

velocity and position, 70–71, 85–86, 318–321, 377–386

rational equations, solving, 11, 144–145

rational inequalities, 12, 145–149

rationalizing substitutions, 119, 570–573

registering for online practice, 2

related rates, 64–66, 283–290

resources, additional, 2–3

Riemann sums

calculating

using left endpoints, 76, 338–340

using midpoints, 77, 343–345

using right endpoints, 76, 340–343

evaluating definite integrals using, 78, 350–353

finding definite integrals from limit and, 78, 348–350

finding expressions for definite integrals with, 77, 346–348

problem types, 75

tips for, 75

right endpoints, calculating Riemann sums with, 76, 340–343

Rolle's theorem, applying, 69, 311–313

roots, approximating using Newton's method, 73, 336–338

Ryan, Mark (author)

Calculus For Dummies, 3

• S •

second derivative test, finding local maxima/minima using, 69, 307–311

simplifying

fractions, 8, 127–131

radicals, 8–9, 131–133

trigonometric expressions, 21–22, 171–173

Simpson's rule, 124, 592–593

solving. *See also* finding

optimization problems, 71–72, 321–335

polynomial equations by factoring, 11, 141–142

problems with mean value theorem, 70, 313–316

rational equations, 11, 144–145

trigonometric equations, 22–23, 173–176

trigonometric equations using inverses, 26–27, 182–185

speed, finding, 70–71, 318–321

squeeze theorem, applying, 32–33, 196–198

Sterling, Mary Jane (author)

Trigonometry For Dummies, 3

substitutions

rationalizing, 119, 570–573

trigonometric, 113, 114, 116–117, 537–556

subtracting polynomials, 14–15, 160

• T •

tangent lines

about, 48

finding equations of, 57, 265–266

finding equations of using implicit differentiation, 61, 274–277

problem types, 55

tips for, 55

trapezoid rule, 124, 591–592

trigonometric equations

solving, 22–23, 173–176

solving using inverses, 26–27, 182–185

trigonometric expressions, simplifying, 21–22, 171–173

trigonometric functions, inverse, 26, 99, 101, 471–481

trigonometric integrals, 113, 114–116, 524–537

trigonometric limits, evaluating, 33, 198–202

trigonometric substitution, 113, 114, 116–117, 537–556

trigonometric values, finding common, 21,
168–170

trigonometry, 17, 18–27, 164–166

Trigonometry For Dummies (Sterling), 3

• *u* •

u-substitution, 107, 108–109, 502–512. *See also*
integration

• *v* •

values, estimating with linearizations, 64,
233–234, 236–237, 279–283

velocity

finding, 70–71, 318–321

finding displacement of particles given, 85,
377–379

finding distance traveled by particles given, 85,
379–381

relating with position, 70, 316–318

volume, finding

using cross-sectional slices, 91, 422–429

using cylindrical shells, 92–93, 429–448

using disks and washers, 89–91, 406–421

• *w* •

Wiley Product Technical Support (website), 2
work, 94–97, 449–463

writing exponents using radical notation, 9

• *z* •

Zegarelli, Mark (author)

Calculus II For Dummies, 3