

INDEX

Symbols

= (assignment) operator, 18, 34
\
 (backslash), 124, 151, 162, 174–175
 line continuation character, 93
^ (caret symbol), 162
 matching beginning of string,
 159–160
 negative character classes, 159
: (colon), 38, 45, 54, 82, 127
{ } (curly brackets), 105, 162
 greedy vs. nongreedy matching,
 156–157
 matching specific repetitions
 with, 156
\$ (dollar sign), 159–160, 162
.
 (dot character), 160–162
 using in paths, 175–176
 wildcard matches, 160–162
" (double quotes), 124
** (exponent) operator, 15
== (equal to) operator, 33, 34
/
 (forward slash), 174–175
 division operator, 15, 88
> (greater than) operator, 33
>= (greater than or equal to)
 operator, 33
(hash character), 126
// (integer division/floored quotient)
 operator, 15
< (less than) operator, 33
<= (less than or equal to) operator, 33
% (modulus/remainder) operator,
 15, 88
* (multiplication) operator, 15, 83, 88
!= (not equal to) operator, 33
() (parentheses), 96–97, 152–153
| (pipe character), 153–154, 164–165
+ (plus sign), 155–156, 162
 addition operator, 15, 17, 83, 88
? (question mark), 154–155, 162
' (single quote), 124

[] (square brackets), 80, 162
* (star), 162
 using with wildcard character, 161
 zero or more matches with, 155
- (subtraction) operator, 15, 88
''' (triple quotes), 125, 164
_ (underscore), 20

A

%A directive, 344
%a directive, 344
absolute paths, 175–179
abspath() function, 177
addition (+) operator, 15, 17, 83, 88
additive color model, 389
add_heading() method, 314
addPage() method, 299
add_paragraph() method, 313–314
add_picture() method, 315
add_run() method, 313–314
algebraic chess notation, 112–113
all_caps attribute, 311
ALL search key, 369
alpha, defined, 388
and operator, 35
ANSWERED search key, 370
API (application programming
 interface), 327–328
append() method, 89–90
application-specific passwords, 365
args keyword, 349
arguments, function, 23, 63
 keyword arguments, 65–66
 passing to processes, 354
 passing to threads, 348–349
assertions, 219–221
assignment (=) operator, 18, 34
AT&T mail, 363, 367
attributes, HTML, 241, 248
augmented assignment operators,
 88–89

B

- `\b` backspace escape character, 419
- `%B` directive, 344
- `%b` directive, 344
- `back()` method, 261
- backslash (`\`), 124, 151, 162, 174–175
- `BarChart()` function, 290
- `basename()` function, 178
- BCC search key, 370
- Beautiful Soup, 245. *See also* `bs4` module
- BeautifulSoup objects, 245–246
- BEFORE search key, 369
- binary files, 180–181, 184–185
- binary operators, 35–37
- bitwise or operator, 164–165
- blank strings, 17
- blocking execution, 337
- blocks of code, 37–38
- BODY search key, 369
- bold attribute, 311
- Boolean data type
 - binary operators, 35–36
 - flow control and, 32–33
 - in operator, 87
 - not in operator, 87
 - “truthy” and “falsey” values, 53
 - using binary and comparison operators together, 36–37
- box tuples, 390
- breakpoints, debugging using, 229–231
- break statements
 - overview, 49–50
 - using in for loop, 55
- browser, opening using `webbrowser` module, 234–236
- `bs4` module
 - creating object from HTML, 245–246
 - finding element with `select()` method, 246–247
 - getting attribute, 248
 - overview, 245
- built-in functions, 57
- bulleted list, creating in Wiki markup, 139–141
 - copying and pasting clipboard, 139–140
 - joining modified lines, 141
 - overview, 139
 - separating lines of text, 140

C

- calling functions, 23
- call stack, defined, 217
- camelcase, 21
- caret symbol (`^`), 162
 - matching beginning of string, 159–160
 - negative character classes, 159
- Cascading Style Sheets (CSS)
 - matching with `selenium` module, 258
 - selectors, 246–247
- case sensitivity, 21, 163
- CC search key, 370
- Cell objects, 268–269
- cells, in Excel spreadsheets, 266
 - accessing Cell object by its name, 268–269
 - merging and unmerging, 286–287
 - writing values to, 278–279
- `center()` method, 133–134, 426
- chaining method calls, 398
- character classes, 158–159, 162
- character styles, 310
- charts, Excel, 288–290
- `chdir()` function, 175
- Chrome, developer tools in, 242–243
- `clear()` method, 258
- `click()` function, 420, 430, 431
- clicking mouse, 420
- `click()` method, 259
- clipboard, using string from, 236
- CMYK color model, 389
- colon (`:`), 38, 45, 54, 82, 127
- color values
 - CMYK vs. RGB color models, 389
 - RGBA values, 388–389
- `column_index_from_string()` function, 270
- columns, in Excel spreadsheets
 - setting height and width of, 285–286
 - slicing Worksheet objects to get Cell objects in, 270–272
- Comcast mail, 363, 367
- comma-delimited items, 80
- command line arguments, 235
- `commentAfterDelay()` function, 429
- comments
 - multiline, 126
 - overview, 23

- comparison operators
 - overview, 33–35
 - using binary operators with, 36–37
- compile() function, 151, 152, 164–165
- compressed files
 - backing up folder into, 209–212
 - creating ZIP files, 205–206
 - extracting ZIP files, 205
 - overview, 203–204
 - reading ZIP files, 204
- computer screen
 - coordinates of, 415
 - resolution of, 416
- concatenation
 - of lists, 83
 - string, 17–18
- concurrency issues, 349
- conditions, defined, 37
- continue statements
 - overview, 50–53
 - using in for loop, 55
- Coordinated Universal Time (UTC), 336
- coordinates
 - of computer screen, 415
 - of an image, 389–390
- copy() function, 100–101, 135, 198, 394
- copytree() function, 198–199
- countdown project, 357–358
 - counting down, 357
 - overview, 357
 - playing sound file, 357–358
- cProfile.run() function, 337
- crashes, program, 14
- create_sheet() method, 278
- CRITICAL level, 224
- cron, 354
- cropping images, 393–394
- CSS (Cascading Style Sheets)
 - matching with selenium module, 258
 - selectors, 246–247
- CSV files
 - defined, 319
 - delimiter for, 324
 - format overview, 320
 - line terminator for, 324
 - Reader objects, 321
 - reading data in loop, 322
 - removing header from, 324–327
 - looping through CSV files, 325
 - overview, 324–325
 - reading in CSV file, 325–326
 - writing out CSV file, 326–327
 - Writer objects, 322–323

- curly brackets ({}), 105, 162
 - greedy vs. nongreedy matching, 156–157
 - matching specific repetitions with, 156
- current working directory, 175

D

- \d character class, 158
- \d character class, 158
- %d directive, 344
- data structures
 - algebraic chess notation, 112–113
 - tic-tac-toe board, 113–117
- data types
 - Booleans, 32
 - defined, 16
 - dictionaries, 105–106
 - floating-point numbers, 17
 - integers, 17
 - list() function, 97
 - lists, 80
 - mutable vs. immutable, 94–96
 - None value, 65
 - strings, 17
 - tuple() function, 97
 - tuples, 96–97
- datetime module
 - arithmetic using, 343
 - converting objects to strings, 344–345
 - converting strings to objects, 345
 - fromtimestamp() function, 341
 - now() function, 341
 - overview, 341–342, 346
 - pausing program until time, 344
 - timedelta data type, 342–343
 - total_seconds() method, 342
- datetime objects, 341–342
 - converting to strings, 344–345
 - converting from strings to, 345
- debug() function, 222
- debugging
 - assertions, 219–221
 - defined, 4
 - getting traceback as string, 217–218
 - in IDLE
 - overview, 225–227
 - stepping through program, 227–229
 - using breakpoints, 229–231

- debugging (*continued*)
 - logging
 - disabling, 224–225
 - to file, 225
 - levels of, 223–224
 - logging module, 221–223
 - print() function and, 223
 - raising exceptions, 216–217
 - DEBUG level, 223
 - decimal numbers. *See* floating-point numbers
 - decode() method, 374–375
 - decryption, of PDF files, 297–298
 - deduplicating code, 62
 - deepcopy() function, 100–101
 - def statements, 62
 - with parameters, 63
 - DELETED search key, 370
 - delete_messages() method, 375
 - deleting files/folders
 - permanently, 200–201
 - using send2trash module, 201–202
 - del statements, 84
 - dictionaries
 - copy() function, 100–101
 - deepcopy() function, 100–101
 - get() method, 109
 - in operator, 109
 - items() method, 107–108
 - keys() method, 107–108
 - lists vs., 106–107
 - nesting, 117–119
 - not in operator, 109
 - overview, 105–106
 - setdefault() method, 110–111
 - values() method, 107–108
 - directories
 - absolute vs. relative paths, 175–176
 - backslash vs. forward slash, 174–175
 - copying, 198–199
 - creating, 176
 - current working directory, 175
 - defined, 173–174
 - deleting permanently, 200–201
 - deleting using send2trash module, 201–202
 - moving, 199–200
 - os.path module
 - absolute paths in, 177–179
 - file sizes, 179–180
 - folder contents, 179–180
 - overview, 177
 - path validity, 180
 - relative paths in, 177–179
 - renaming, 199–200
 - walking, 202–203
 - dirname() function, 178
 - disable() function, 224
 - division (/) operator, 15, 88
 - Document objects, 307–308
 - dollar sign (\$), 159–160, 162
 - dot character (.), 160–162
 - using in paths, 175–176
 - wildcard matches, 160–162
 - dot-star character (.*), 161
 - doubleClick() function, 420, 430
 - double quotes ("), 124
 - double_strike attribute, 311
 - downloading
 - files from web, 239–240
 - web pages, 237–238
 - XKCD comics, 251–256, 350–352
 - DRAFT search key, 370
 - dragging mouse, 420–422
 - dragRel() function, 420, 422, 430
 - dragTo() function, 420, 430
 - drawing on images
 - ellipses, 407
 - example program, 407–408
 - ImageDraw module, 406
 - lines, 406–407
 - points, 406
 - polygons, 407
 - rectangles, 407
 - text, 408–410
 - dumps() function, 329
 - duration keyword arguments, 416

E

 - ehlo() method, 364, 379
 - elements, HTML, 240
 - elif statements, 40–45
 - ellipse() method, 407
 - else statements, 39–40
 - email addresses, extracting, 165–169
 - creating regex, 166–167
 - finding matches on clipboard, 167–168
 - joining matches into a string, 168
 - overview, 165–166
 - emails
 - deleting, 375
 - disconnecting from server, 375–376
 - fetching

- folders, 368–369
 - getting message content, 372–373
 - logging into server, 368
 - overview, 366–367
 - raw messages, 373–375
 - gmail_search() method, 372
 - IMAP, 366
 - marking message as read, 372–373
 - searching, 368–371
 - sending
 - connecting to SMTP server, 363–364
 - disconnecting from server, 366
 - logging into server, 364–365
 - overview, 362
 - reminder, 376–380
 - sending “hello” message, 364
 - sending message, 365
 - TLS encryption, 364
 - SMTP, 362
 - emboss attribute, 311
 - encryption, of PDF files, 302–303
 - endwith() method, 131
 - epoch timestamps, 336, 341, 346
 - equal to (==) operator, 33, 34
 - ERROR level, 224
 - errors
 - crashes and, 14
 - help for, 8–9
 - escape characters, 124–125
 - evaluation, defined, 14
 - Excel spreadsheets
 - application support, 265–266
 - charts in, 288–290
 - column width, 285–286
 - converting between column letters and numbers, 270
 - creating documents, 277
 - creating worksheets, 278
 - deleting worksheets, 278
 - font styles, 282–284
 - formulas in, 284–285
 - freezing panes, 287–288
 - getting cell values, 268–269
 - getting rows and columns, 270–272
 - getting worksheet names, 268
 - merging and unmerging cells, 286–287
 - opening documents, 267
 - openpyxl module, 266
 - overview, 266–267
 - reading files
 - overview, 272–273
 - populating data structure, 274–275
 - reading data, 273–274
 - writing results to file, 275–276
 - and reminder emails project, 376–380
 - row height, 285–286
 - saving workbooks, 277
 - updating, 279–281
 - overview, 279–280
 - setup, 280
 - workbooks vs., 266
 - writing values to cells, 278–279
 - Exception objects, 217
 - exceptions
 - assertions and, 219–221
 - getting traceback as string, 217–218
 - handling, 72–74
 - raising, 216–217
 - execution, program
 - defined, 31
 - overview, 38
 - pausing until specific time, 344
 - terminating program with sys.exit(), 58
 - exists() function, 180
 - exit codes, 353–354
 - expand keyword, 398
 - exponent (**) operator, 15
 - expressions
 - conditions and, 37
 - in interactive shell, 14–16
 - expunge() method, 375
 - extensions, file, 173
 - extractall() method, 205
 - extracting ZIP files, 205
 - extract() method, 205
- ## F
- FailSafeException exception, 434
 - “falsey” values, 53
 - fetch() method, 371, 372–373
 - file editor, 21
 - file management
 - absolute vs. relative paths, 175–176
 - backslash vs. forward slash, 174–175
 - compressed files
 - backing up to, 209–212
 - creating ZIP files, 205–206

- file management (*continued*)
 - compressed files (*continued*)
 - extracting ZIP files, 205
 - overview, 203–204
 - reading ZIP files, 204
 - creating directories, 176
 - current working directory, 175
 - multiclipboard project, 191–193
 - opening files, 181–182
 - os.path module
 - absolute paths in, 177–179
 - file sizes, 179–180
 - folder contents, 179–180
 - overview, 177
 - path validity, 180
 - relative paths in, 177–179
 - overview, 173–174
 - paths, 173–174
 - plaintext vs. binary files, 180–181
 - reading files, 182–183
 - renaming files, date styles, 206–209
 - saving variables with `pformat()`
 - function, 185–186
 - send2trash module, 201–202
 - shelve module, 184–185
 - shutil module
 - copying files/folders, 198–199
 - deleting files/folders, 200–201
 - moving files/folders, 199–200
 - renaming files/folders, 199–200
 - walking directory trees, 202–203
 - writing files, 183–184
- filenames, defined, 173
- File objects, 182
- `findall()` method, 157–158
- `find_element_by_*` methods, 257–258
- `find_elements_by_*` methods, 257–258
- Firefox, developer tools in, 243
- FLAGGED search key, 370
- flipping images, 398–399
- `float()` function, 25–28
- floating-point numbers
 - integer equivalence, 27
 - overview, 17
 - rounding, 338
- flow control
 - binary operators, 35–36
 - blocks of code, 37–38
 - Boolean values and, 32–33
 - break statements, 49–50
 - comparison operators, 33–35
 - conditions, 37
 - continue statements, 50–53
 - elif statements, 40–45
 - else statements, 39–40
 - if statements, 38–39
 - overview, 31–32
 - using binary and comparison
 - operators together, 36–37
 - while loops, 45–49
- folders
 - absolute vs. relative paths, 175–176
 - backing up to ZIP file, 209–212
 - creating new ZIP file, 211
 - figuring out ZIP filename, 210–211
 - walking directory tree, 211–212
 - backslash vs. forward slash, 174–175
 - copying, 198–199
 - creating, 176
 - current working directory, 175
 - defined, 173–174
 - deleting permanently, 200–201
 - deleting using `send2trash` module, 201–202
 - moving, 199–200
 - os.path module
 - absolute paths in, 177–179
 - file sizes, 179–180
 - folder contents, 179–180
 - overview, 177
 - path validity, 180
 - relative paths in, 177–179
 - renaming, 199–200
 - walking directory trees, 202–203
- Font objects, 282–283
- font styles, in Excel spreadsheets, 282–284
- for loops
 - overview, 53–56
 - using dictionary items in, 108
 - using lists with, 86
- `format` attribute, 392
- `format_description` attribute, 392
- `formData` list, 434
- form filler project, 430–437
 - overview, 430–431
 - radio buttons, 435–436
 - select lists, 435–436
 - setting up coordinates, 432–434
 - steps in process, 431
 - submitting form, 436–437
 - typing data, 434–435

- formulas, in Excel spreadsheets, 284–285
- forward() method, 261
- forward slash (/), 174–175
- FROM search key, 370
- fromtimestamp() function, 341, 346
- functions. *See also names of individual functions*
 - arguments, 23, 63
 - as “black box”, 72
 - built-in, 57
 - def statements, 63
 - exception handling, 72–74
 - keyword arguments, 65–66
 - None value and, 65
 - overview, 61–62
 - parameters, 63
 - return values, 63–65

G

- get_active_sheet() method, 268
- get_addresses() method, 374
- get_attribute() method, 258
- getColor() function, 388–389, 393
- get_column_letter() function, 270
- getcwd() function, 175
- get() function
 - overview, 109
 - requests module, 237
- get_highest_column() method, 269, 377
- get_highest_row() method, 269
- get_payload() method, 374–375
- getpixel() function, 400, 423, 424
- get_sheet_by_name() method, 268
- get_sheet_names() method, 268
- getsize() function, 179
- get_subject() method, 374
- getText() function, 308–309
- GIF format, 392
- global scope, 70–71
- Gmail, 363, 365, 367
- gmail_search() method, 372
- Google Maps, 234–236
- graphical user interface automation. *See* GUI (graphical user interface) automation
- greater than (>) operator, 33
- greater than or equal to (>=) operator, 33
- greedy matching
 - dot-star for, 161
 - in regular expressions, 156–157

- group() method, 151, 152–153
- groups, regular expression
 - matching
 - greedy, 156–157
 - nongreedy, 157
 - one or more, 155–156
 - optional, 154–155
 - specific repetitions, 156
 - zero or more, 155
 - using parentheses, 152–153
 - using pipe character in, 153–154
- Guess the Number program, 74–76
- GUI (graphical user interface)
 - automation. *See also* form filler project
 - controlling keyboard, 426–429
 - hotkey combinations, 429
 - key names, 427–428
 - pressing and releasing, 428–429
 - sending string from keyboard, 426–427
 - controlling mouse, 415–417, 419–423
 - clicking mouse, 420
 - dragging mouse, 420–422
 - scrolling mouse, 422–423
 - determining mouse position, 417–419
 - image recognition, 425–426
 - installing pyautogui module, 414
 - logging out of program, 414
 - overview, 413–414
 - screenshots, 423–424
 - stopping program, 414–415

H

- %H directive, 344
- hash character (#), 126
- headings, Word document, 314–315
- help
 - asking online, 9–10
 - for error messages, 8–9
- hotkey combinations, 429
- hotkey() function, 429, 430
- Hotmail.com, 363, 367
- HTML (Hypertext Markup Language)
 - browser developer tools and, 242–243
 - finding elements, 244
 - learning resources, 240
 - overview, 240–241
 - viewing page source, 241–242

- I
- %I directive, 344
- id attribute, 241
- IDLE (interactive development environment)
 - creating programs, 21–22
 - debugging in
 - overview, 225–227
 - stepping through program, 227–229
 - using breakpoints, 229–231
 - expressions in, 14–16
 - overview, 8
 - running scripts outside of, 136
 - starting, 7–8
- if statements
 - overview, 38–39
 - using in while loop, 46–47
- imageDraw module, 406
- imageDraw objects, 406–408
- ImageFont objects, 408–410
- Image objects, 391–399
- images
 - adding logo to, 401–405
 - attributes for, 392–393
 - box tuples, 390
 - color values in, 388–389
 - coordinates in, 389–390
 - copying and pasting in, 394–396
 - cropping, 393–394
 - drawing on
 - example program, 407–408
 - ellipses, 407
 - ImageDraw module, 406
 - lines, 406–407
 - points, 406
 - polygons, 407
 - rectangles, 407
 - text, 408–410
 - flipping, 398–399
 - opening with Pillow, 390–391
 - pixel manipulation, 400
 - recognition of, 425–426
 - resizing, 397
 - RGBA values, 388–389
 - rotating, 398–399
 - transparent pixels, 397
- IMAP (Internet Message Access Protocol)
 - defined, 366
 - deleting messages, 375
 - disconnecting from server, 375–376
 - fetching messages, 372–375
 - folders, 368–369
 - logging into server, 368
 - searching messages, 368–371
- imapclient module, 366
- IMAPClient objects, 367–368
- immutable data types, 94–96
- importing modules
 - overview, 57–58
 - pyautogui module, 417
- imprint attribute, 311
- im variable, 423
- indentation, 93
- indexes
 - for dictionaries. *See* keys, dictionary
 - for lists
 - changing values using, 83
 - getting value using, 80–81
 - negative, 82
 - removing values from list using, 84
 - for strings, 126–127
- IndexError, 106
- index() method, 89
- infinite loops, 49, 51, 418
- INFO level, 223
- in operator
 - using with dictionaries, 109
 - using with lists, 87
 - using with strings, 127
- input() function
 - overview, 23–24, 89–90
 - using for sensitive information, 365
- installing
 - openpyxl module, 266
 - pyautogui module, 414
 - Python, 6–7
 - selenium module, 256
 - third-party modules, 441–442
- int, 17. *See also* integers
- integer division/floored quotient (//) operator, 15
- integers
 - floating-point equivalence, 27
 - overview, 17
- interactive development environment. *See* IDLE (interactive development environment)
- interactive shell. *See* IDLE
- Internet Explorer, developer tools in, 242–243

Internet Message Access Protocol. *See*
 IMAP (Internet Message
 Access Protocol)

interpreter, Python, 7

int() function, 25–28

isabs() function, 177

isalnum() method, 129–131

isalpha() method, 129–130

isdecimal() method, 129–131

isdir() function, 180

is_displayed() method, 258

is_enabled() method, 258

isfile() function, 180

islower() method, 128–129

is_selected() method, 258

isspace() method, 130

istitle() method, 130

isupper() method, 128–129

italic attribute, 311

items() method, 107–108

iter_content() method, 239–240

J

%j directive, 344

join() method, 131–132, 174–175,
 177, 352

JPEG format, 392

JSON files

- APIs for, 327–328
- defined, 319–320
- format overview, 327–328
- reading, 328–329
- and weather data project, 329–332
- writing, 329

justifying text, 133–134

K

keyboard

- controlling, with PyAutoGUI
 - hotkey combinations, 429
 - pressing and releasing keys,
 428–429
 - sending string from keyboard,
 426–427
 - key names, 427–428
- KeyboardInterrupt exception, 340,
 417, 418
- keyDown() function, 428, 429, 430
- keys, dictionary, 105

keys() method, 107–108

keyUp() function, 428, 429, 430

keyword arguments, 65–66

L

LARGER search key, 370

launchd, 354–355

launching programs

- and countdown project, 357–358
- opening files with default
 applications, 355–356
- opening websites, 355
- overview, 352–354
- passing command line arguments
 to processes, 354
- poll() method, 353
- running Python scripts, 355
- scheduling, 354–355
- sleep() function, 355
- wait() method, 354

len() function, 307–308

- finding number of values in list, 83
- overview, 24–25

less than (<) operator, 33

less than or equal to (<=) operator, 33

LibreOffice, 265, 306

line breaks, Word document, 315

LineChart() function, 290

line continuation character (\), 93

line() method, 406–407

linked styles, 310

Linux

- backslash vs. forward slash, 174–175
- cron, 354
- installing Python, 7
- installing third-party modules, 442
- launching processes from
 Python, 353
- logging out of automation
 program, 414
- opening files with default
 applications, 355
- pip tool on, 441–442
- Python support, 4
- running Python programs on, 445
- starting IDLE, 8
- Unix philosophy, 356

listdir() function, 179

list_folders() method, 368–369

list() function, 321, 426

- lists
 - append() method, 89–90
 - augmented assignment operators, 88–89
 - changing values using index, 83
 - concatenation of, 83
 - copy() function, 100–101
 - deepcopy() function, 100–101
 - dictionaries vs., 106–107
 - finding number of values using len(), 83
 - getting sublists with slices, 82–83
 - getting value using index, 80–81
 - index() method, 89
 - in operator, 87
 - insert() method, 89–90
 - list() function, 97
 - Magic 8 Ball example program using, 92–93
 - multiple assignment trick, 87–88
 - mutable vs. immutable data types, 94–96
 - negative indexes, 82
 - nesting, 117–119
 - not in operator, 87
 - overview, 80
 - remove() method, 90–91
 - removing values from, 84
 - replication of, 83
 - sort() method, 91–92
 - storing variables as, 84–85
 - using with for loops, 86
 - ljust() method, 133–134
 - load_workbook() function, 267
 - loads() function, 328–329, 331
 - local scope, 67–70
 - locateAllOnScreen() function, 426
 - locateOnScreen() function, 425
 - location attribute, 258
 - logging
 - disabling, 224–225
 - to file, 225
 - levels of, 223–224
 - print() function and, 223
 - logging module, 221–223
 - logging out, of automation program, 414
 - login() method, 364, 368, 379
 - logo, adding to an image, 401–406
 - looping over files, 402–403
 - opening logo image, 401–402
 - overview, 404
 - resizing image, 403–404
 - logout() method, 375–376
 - LogRecord objects, 221
 - loops
 - break statements, 49–50
 - continue statements, 50–53
 - for loop, 53–56
 - range() function for, 56–57
 - reading data from CSV file, 322
 - using lists with, 86
 - while loop, 45–49
 - lower() method, 128–129
 - lstrip() method, 134–135
- ## M
- %M directive, 344
 - %m directive, 344
 - Mac OS X. *See* OS X
 - Magic 8 Ball example program, 92–93
 - makedirs() function, 176, 403
 - maps, open when location is copied, 234–236
 - figuring out URL, 234–235
 - handling clipboard content, 236
 - handling command line argument, 235–236
 - launching browser, 236
 - overview, 234
 - Match objects, 151
 - math
 - operators for, 15
 - programming and, 4
 - mergePage() method, 302
 - Message objects, 381–382
 - methods
 - chaining calls, 398
 - defined, 89
 - dictionary
 - get() method, 109
 - items() method, 107–108
 - keys() method, 107–108
 - setdefault() method, 110–111
 - values() method, 107–108
 - list
 - append() method, 89–90
 - index() method, 89
 - insert() method, 89–90
 - remove() method, 90–91
 - sort() method, 91–92
 - string
 - center() method, 133–134
 - copy() method, 135
 - endswith() method, 131

- isalnum() method, 129–131
- isalpha() method, 129–130
- isdecimal() method, 129–131
- islower() method, 128–129
- isspace() method, 130
- istitle() method, 130
- isupper() method, 128–129
- join() method, 131–132
- ljust() method, 133–134
- lower() method, 128–129
- lstrip() method, 134–135
- paste() method, 135
- rjust() method, 133–134
- rstrip() method, 134–135
- split() method, 131–133
- startswith() method, 131
- strip() method, 134–135
- upper() method, 128–129
- Microsoft Windows. *See* Windows OS
- middleClick() function, 420, 430
- modules
 - importing, 57–58
 - third-party, installing, 442
- modulus/remainder (%) operator, 15, 88
- Monty Python, 4
- mouse
 - controlling, 415–417, 419–423
 - clicking mouse, 420
 - dragging mouse, 420–422
 - scrolling mouse, 422–423
 - determining position of, 417–419
 - locating, 417–419
 - getting coordinates, 418–419
 - handling KeyboardInterrupt exception, 418
 - importing pyautogui module, 418
 - infinite loop, 418
 - overview, 417
 - and pixels, identifying colors of, 424–425
- mouseDown() function, 420, 430
- mouse.position() function, 418
- mouseUp() function, 430
- move() function, 199–200
- moveRel() function, 416, 417, 420, 430
- moveTo() function, 416, 420, 430
- moving files/folders, 199–200
- multiclipboard project, 191–193
 - listing keywords, 193
 - loading keyword content, 193
 - overview, 191
 - saving clipboard content, 192
 - setting up shelf file, 192
- multiline comments, 126
- multiline strings, 125–126
- multiple assignment trick, 87–88
- multiplication (*) operator, 15, 83, 88
- multithreading
 - concurrency issues, 349
 - downloading multiple images, , 350–352
 - creating and starting threads, 351–352
 - using downloadXkcd() function, 350–351
 - waiting for threads to end, 352
 - join() method, 352
 - overview, 347–348
 - passing arguments to threads, 348–349
 - start() method, 348, 349
 - Thread() function, 347–348
- mutable data types, 94–96

N

- NameError, 84
- namelist() method, 204
- negative character classes, 159
- negative indexes, 82
- nested lists and dictionaries, 117–119
- newline keyword argument, 322
- None value, 65
- nongreedy matching
 - dot, star, and question mark for, 161
 - in regular expressions, 157
- not equal to (!=) operator, 33
- not in operator
 - using with dictionaries, 109
 - using with lists, 87
 - using with strings, 127
- not operator, 36
- NOT search key, 370
- now() function, 341, 346

O

- ON search key, 369
- open() function, 181–182, 234, 355–356, 391
- opening files, 181–182
- OpenOffice, 265, 306
- open program, 355

- openpyxl module, installing, 266
- operators
 - augmented assignment, 88–89
 - binary, 35–36
 - comparison, 33–35
 - defined, 14
 - math, 15
 - using binary and comparison
 - operators together, 36–37
- order of operations, 15
- or operator, 36
- OR search key, 370
- OS X
 - backslash vs. forward slash, 174–175
 - installing Python, 7
 - installing third-party modules, 442
 - launchd, 354
 - launching processes from
 - Python, 356
 - logging out of automation
 - program, 414
 - opening files with default
 - applications, 355–356
 - pip tool on, 441–442
 - Python support, 4
 - running Python programs on, 445
 - starting IDLE, 8
 - Unix philosophy, 356
- outline attribute, 311
- Outlook.com, 363, 367

P

- %p directive, 344
- page breaks, Word document, 315
- Page objects, 297
- Paragraph objects, 307
- paragraphs, Word document, 309–310
- parameters, function, 63
- parentheses (), 96–97, 152–153
- parsing, defined, 245
- passing arguments, 23
- passing references, 100
- passwords
 - application-specific, 365
 - managing project, 136–138
 - command-line arguments, 137
 - copying password, 137–138
 - data structures, 136–137
 - overview, 136
- pastebin.com, 10
- paste() method, 135, 394, 395

- paths
 - absolute vs. relative, 175–176
 - backslash vs. forward slash, 174–175
 - current working directory, 175
 - overview, 173–174
 - os.path module
 - absolute paths in, 177–179
 - file sizes, 179–180
 - folder contents, 179–180
 - overview, 177
 - path validity, 180
 - relative paths in, 177–179
- PAUSE variable, 415, 434
- PdfFileReader objects, 297–298
- PDF files
 - combining pages from multiple
 - files, 303–306
 - adding pages, 303
 - finding PDF files, 304
 - opening PDFs, 304–305
 - overview, 303
 - saving results, 305–306
 - creating, 298–299
 - decrypting, 297–298
 - encrypting, 302–303
 - extracting text from, 296–297
 - format overview, 295–296
 - pages in
 - copying, 299–300
 - overlying, 301–302
 - rotating, 300–301
- PdfFileWriter objects, 298–299
- pformat() function
 - overview, 111–112
 - saving variables in text files using, 185–186
- phone numbers, extracting, 165–169
 - creating regex, 166
 - finding matches on clipboard, 167–168
 - joining matches into a
 - string, 168
 - overview, 165–166
- Pillow
 - copying and pasting in images, 394–396
 - cropping images, 393–394
 - drawing on images
 - ellipses, 407
 - example program, 407–408
 - ImageDraw module, 406
 - lines, 406–407

- points, 406
 - polygons, 407
 - rectangles, 407
 - text, 408–410
- flipping images, 398–399
- image attributes, 392–393
- module, 388
- opening images, 390–391
- pixel manipulation, 400
- resizing images, 397
- rotating images, 398–399
- transparent pixels, 397
- pipe character (`|`), 153–154, 164–165
- pip tool, 441–442
- `pixelMatchesColor()` function, 424, 435
- pixels, 388, 400
- plaintext files, 180–181
- plus sign (+), 155–156, 162
- PNG format, 392
- `point()` method, 406
- `poll()` method, 353
- `polygon()` method, 407
- `Popen()` function, 352–353
 - opening files with default applications, 355–356
 - passing command line arguments to, 354
- `position()` function, 417, 419
- `pprint()` function, 111–112
- precedence of math operators, 15
- `press()` function, 429, 430, 436
- `print()` function, 435
 - logging and, 223
 - overview, 23
 - passing multiple arguments to, 66
 - using variables with, 24
- processes
 - and countdown project, 357–358
 - defined, 352
 - opening files with default applications, 355–356
 - opening websites, 355
 - passing command line arguments to, 354
 - `poll()` method, 353
 - `Popen()` function, 352–353
 - `wait()` method, 354
- profiling code, 336–337
- programming
 - blocks of code, 37–38
 - comments, 23
 - creativity needed for, 5
 - deduplicating code, 62
 - defined, 3
 - exception handling, 72–74
 - execution, program, 38
 - functions as “black boxes”, 72
 - global scope, 70–71
 - indentation, 93
 - local scope, 67–70
 - math and, 4
 - Python, 4
 - terminating program with `sys.exit()`, 58
- projects
 - Adding Bullets to Wiki Markup, 139–141
 - Adding a Logo, 401–406
 - Automatic Form Filler, 430–437
 - Backing Up a Folder into a ZIP File, 209–212
 - Combining Select Pages from Many PDFs, 303–306
 - Downloading All XKCD Comics, 251–256
 - Extending the mouseNow Program, 424–425
 - Fetching Current Weather Data, 329–332
 - Generating Random Quiz Files, 186–191
 - “I’m Feeling Lucky” Google Search, 248–251
 - “Just Text Me” Module, 383
 - mapIt.py* with the webbrowser Module, 234–236
 - Multiclipboard, 191–193
 - Multithreaded XKCD Downloader, 350–352
 - Password Locker, 136–138
 - Phone Number and Email Address Extractor, 165–169
 - Reading Data from a Spreadsheet, 272–276
 - Removing the Header from CSV Files, 324–327
 - Renaming Files with American-Style Dates to European-Style Dates, 206–209
 - Sending Member Dues Reminder Emails, 376–379
 - Simple Countdown Program, 357–358
 - Super Stopwatch, 338–340

projects (*continued*)

- Updating a Spreadsheet, 279–281
 - “Where Is the Mouse Right Now?”, 417–419
- putpixel() method, 400
- pyautogui.click() function, 431
- pyautogui.click() method, 420
- pyautogui.doubleClick() function, 420
- pyautogui.dragTo() function, 420
- pyautogui.FailSafeException
 - exception, 415
- pyautogui.hotkey() function, 429
- pyautogui.keyDown() function, 428
- pyautogui.keyUp() function, 428
- pyautogui.middleClick() function, 420
- pyautogui module
 - form filler project, 430–437
 - controlling keyboard, 426–429
 - hotkey combinations, 429
 - key names, 427–428
 - pressing and releasing keys, 428–429
 - sending string from keyboard, 426–427
 - controlling mouse, 415–417, 419–423
 - clicking mouse, 420
 - dragging mouse, 420–422
 - scrolling mouse, 422–423
 - documentation for, 414
 - fail-safe feature, 415
 - functions, 430
 - image recognition, 425–426
 - importing, 417
 - installing, 414
 - pausing function calls, 415
 - screenshots, 423–424
 - pyautogui.mouseDown() function, 420
 - pyautogui.moveRel() function, 416, 417
 - pyautogui.moveTo() function, 416
 - pyautogui.PAUSE variable, 415
 - pyautogui.position() function, 419
 - pyautogui.press() function, 436
 - pyautogui.rightClick() function, 420
 - pyautogui.screenshot() function, 423
 - pyautogui.size() function, 416
 - pyautogui.typewrite() function, 426, 427, 431
 - py.exe program, 444–445
 - pyobjc module, 442

PyPDF2 module

- combining pages from multiple PDFs, 303–306
- creating PDFs, 298–299
- decrypting PDFs, 297–298
- encrypting PDFs, 302–303
- extracting text from PDFs, 296–297
- format overview, 295–296
- pages in PDFs
 - copying, 299–300
 - overlying, 301–302
 - rotating, 300–301
- pyperclip module, 135
- Python
 - data types, 16–17
 - downloading, 6
 - example program, 21–22
 - help, 8–9
 - installing, 6–7
 - interactive shell, 8
 - interpreter, defined, 7
 - math and, 4
 - overview, 4
 - programming overview, 3
 - starting IDLE, 7–8
- python-docx module, 306
- pyzmail module, 366, 373–375
- PyzMessage objects, 373–375

Q

- question mark (?), 154–155, 162
- quit() method, 261, 366, 379
- quiz generator, 186–190
 - creating quiz file, 188
 - creating answer options, 189
 - overview, 186
 - shuffling question order, 188
 - storing quiz data in dictionary, 187
 - writing content to files, 189–191

R

- radio buttons, 435–436
- raise_for_status() method, 238
- raise keyword, 216–217
- range() function, 56–57
- raw strings, 125, 151
- Reader objects, 321–322
- reading files, 182–183, 204
- readlines() method, 182

- read() method, 182
- rectangle() method, 407
- Reddit, 9
- Reference objects, 289
- references
 - overview, 97–99
 - passing, 100
- refresh() method, 261
- Regex objects
 - creating, 150
 - matching, 151
- regular expressions
 - beginning of string matches, 159–160
 - case sensitivity, 163
 - character classes, 158–159
 - creating Regex objects, 150–151
 - defined, 147–148
 - end of string matches, 159–160
 - extracting phone numbers and emails addresses, 165–169
 - findall() method, 157–158
 - finding text without, 148–150
 - greedy matching, 156–157
 - grouping
 - matching specific repetitions, 156
 - one or more matches, 155–156
 - optional matching, 154–155
 - using parentheses, 152–153
 - using pipe character in, 153–154
 - zero or more matches, 155
 - HTML and, 243
 - matching with, 151–152
 - multiple arguments for compile() function, 164–165
 - nongreedy matching, 157
 - patterns for, 150
 - spreading over multiple lines, 164
 - substituting strings using, 163–164
 - symbol reference, 162
 - wildcard character, 160–162
- relative paths, 175–179
- relpath() function, 177, 178
- remainder/modulus (%) operator, 15, 88
- remove() method, 90–91
- remove_sheet() method, 278
- renaming files/folders, 199–200
 - date styles, 206–209
 - creating regex for dates, 206
 - identifying dates in filenames, 207–208
 - overview, 206
 - renaming files, 209
- replication
 - of lists, 83
 - string, 18
- requests module
 - downloading files, 239–240
 - downloading pages, 237–238
- resolution of computer screen, 416
- Response objects, 237–238
- return values, function, 63–65
- reverse keyword, 91
- RGBA values, 388–389
- RGB color model, 389
- rightClick() function, 420, 430
- rjust() method, 133–134, 419
- rmdir() function, 200
- rmtree() function, 200
- rotateClockwise() method, 300
- rotateCounterClockwise() method, 300
- rotating images, 398–399
- rounding numbers, 338
- rows, in Excel spreadsheets
 - setting height and width of, 285–286
 - slicing Worksheet objects to get Cell objects in, 270–272
- rstrip() method, 134–135
- rtl attribute, 311
- Run objects, 310, 311–312
- running programs
 - on Linux, 445
 - on OS X, 445
 - overview, 443
 - on Windows, 444–445
 - shebang line, 443–444

S

- \S character class, 158
- \s character class, 158
- %S directive, 344
- Safari, developer tools in, 243
- save() method, 391
- scope
 - global, 70–71
 - local, 67–70
- screenshot() function, 423, 430
- screenshots
 - analyzing, 424
 - getting, 423
- scripts
 - running from Python program, 355
 - running outside of IDLE, 136

- scroll() function, 422, 423, 430
- scrolling mouse, 422–423
- searching
 - email, 368–371
 - the Web, 248–251
 - finding results, 249–250
 - getting command line arguments, 249
 - opening web browser for results, 250–251
 - overview, 248
 - requesting search page, 249
- search() method, 151
- SEEN search key, 370
- see program, 355
- select_folder() method, 369
- select lists, 435–436
- select() method, bs4 module, 246–247
- selectors, CSS, 246–247, 258
- selenium module
 - clicking buttons, 261
 - finding elements, 257–259
 - following links, 259
 - installing, 256
 - sending special keystrokes, 260–261
 - submitting forms, 259–260
 - using Firefox with, 256–257
- send2trash module, 201–202
- sending reminder emails, 376–379
 - finding unpaid members, 378
 - opening Excel file, 376–377
 - overview, 376
 - sending emails, 378–379
- send_keys() method, 259–260
- sendmail() method, 365, 379
- sequence numbers, 373
- sequences, 86
- setdefault() method, 110–111
- shadow attribute, 311
- shebang line, 443–444
- shelve module, 184–185
- Short Message Service (SMS)
 - sending messages, 381–382
 - Twilio service, 380
- shutil module
 - deleting files/folders, 200–201
 - moving files/folders, 199–200
 - renaming files/folders, 199–200
- SID (string ID), 382
- Simple Mail Transfer Protocol. *See* SMTP (Simple Mail Transfer Protocol)
- SINCE search key, 369
- single quote ('), 124
- single-threaded programs, 347
- size() function, 416
- sleep() function, 337–338, 344, 346, 355
- slices
 - getting sublists with, 82–83
 - for strings, 126–127
- small_caps attribute, 311
- SMALLER search key, 370
- SMS (Short Message Service)
 - sending messages, 381–382
 - Twilio service, 380
- SMTP (Simple Mail Transfer Protocol)
 - connecting to server, 363–364
 - defined, 362
 - disconnecting from server, 366
 - logging into server, 364–365
 - sending “hello” message, 364
 - sending message, 365
 - TLS encryption, 364
- SMTP objects, 363–364
- sort() method, 91–92
- sound files, playing, 357–358
- source code, defined, 3
- split() method, 131–133, 178, 320
- spreadsheets. *See* Excel spreadsheets
- square brackets [], 80
- Stack Overflow, 9
- standard library, 57
- star (*), 161, 162
 - using with wildcard character, 161
 - zero or more matches with, 155
- start() method, 348, 349, 351
- start program, 355
- startswith() method, 131
- starttls() method, 364, 379
- step argument, 56
- stopwatch project, 338–340
 - overview, 338–339
 - set up, 339
 - tracking lap times, 339–340
- strftime() function, 344–345, 346
- str() function, 25–28, 97, 419
- strike attribute, 311
- string ID (SID), 382
- strings
 - center() method, 133–134
 - concatenation, 17–18
 - converting datetime objects to, 344–345
 - converting to datetime objects, 345

- copying and pasting, 135
- double quotes for, 124
- endswith() method, 131
- escape characters, 124–125
- extracting PDF text as, 296–297
- getting traceback as, 217–218
- indexes for, 126–127
- in operator, 127
- isalnum() method, 129–131
- isalpha() method, 129–130
- isdecimal() method, 129–131
- islower() method, 128–129
- isspace() method, 130
- istitle() method, 130
- isupper() method, 128–129
- join() method, 131–132
- literals, 124
- ljust() method, 133–134
- lower() method, 128–129
- lstrip() method, 134–135
- multiline, 125–126
- mutable vs. immutable data types, 94–96
- not in operator, 127
- overview, 17
- raw, 125
- replication of, 18
- rjust() method, 133–134
- rstrip() method, 134–135
- slicing, 126–127
- split() method, 131–133
- startswith() method, 131
- strip() method, 134–135
- substituting using regular expressions, 163–164
- upper() method, 128–129
- strip() method, 134–135
- strptime() function, 345, 346
- strs, 17, *See also* strings
- Style objects, 282–283
- SUBJECT search key, 369
- sublists, getting with slices, 82–83
- sub() method, 163–164
- submitButtonColor variable, 432, 435
- submitButton variable, 432
- submit() method, 260
- subprocess module, 335, 352–354
- subtraction (-) operator, 15, 88
- subtractive color model, 389
- Sudoku puzzles, 4
- sys.exit() function, 58

T

- tag_name attribute, 258
- Tag objects, 246–247
- tags, HTML, 240
- Task Scheduler, 354
- termination, program, 22, 58
- text attribute, 308, 311
- text messaging
 - automatic notifications, 383
 - sending messages, 381–382
 - Twilio service, 380
- text() method, 408–410
- TEXT search key, 369
- textsize() method, 409
- third-party modules, installing, 441–442
- Thread() function, 347–348, 351
- threading module, 335, 347
- Thread objects, 347–348
- threads
 - concurrency issues, 349
 - join() method, 352
 - multithreading, 347–348
 - image downloader, 350–352
 - passing arguments to, 348–349
 - processes vs., 352
- tic-tac-toe board, 113–117
- timedelta data type, 342–343, 346
- timedelta objects, 342–343
- time module
 - overview, 346
 - sleep() function, 337–338, 344
 - stopwatch project, 338–340
 - time() function, 336–337
- TLS encryption, 364
- top-level domains, 167
- T0 search key, 370
- total_seconds() method, 342, 346
- traceback, getting from error, 217–218
- transparency, 388, 397
- transpose() method, 399
- triple quotes ('''), 125, 164
- truetype() function, 409
- truth tables, 35–36
- “truthy” values, 53
- tuple data type
 - overview, 96–97
 - tuple() function, 97
- twilio module, 380
- TwilioRestClient objects, 381

- Twilio service
 - automatic text messages, 383
 - overview, 380
 - sending text messages, 381–382
- TypeError, 81, 94
- twoprint() function, 426, 427, 430, 431, 435, 436

U

- Ubuntu, 7
 - cron, 354–355
 - launching processes from Python, 353
 - opening files with default applications, 355
 - Unix philosophy, 356
- UNANSWERED search key, 370
- UNDELETED search key, 370
- underline attribute, 311
- underscore (`_`), 20
- UNDRAFT search key, 370
- UNFLAGGED search key, 370
- Unicode encodings, 239
- Unix epoch, 336, 341, 346
- Unix philosophy, 356
- unlink() function, 200
- UNSEEN search key, 370
- upper() method, 128–129
- UTC (Coordinated Universal Time), 336

V

- ValueError, 88, 345
- values, defined, 14, 150
- values() method, 107–108
- variables. *See also* lists
 - assignment statements, 18–19
 - defined, 18
 - global, 70–71
 - initializing, 19
 - local, 67–70
 - naming, 20–21
 - None value and, 65
 - overwriting, 19–20
 - references, 97–99
 - saving with shelve module, 184–185
 - storing as list, 84–85
- Verizon mail, 363, 367
- volumes, defined, 174

W

- \W character class, 158
- \w character class, 158
- %w directive, 344
- walk() function, 202–203, 354
- WARNING level, 223
- weather data, fetching, 329–332
 - downloading JSON data, 330–331
 - getting location, 330
 - loading JSON data, 331–332
 - overview, 329
- webbrowser module
 - open() function, 355
 - opening browser using, 234–236
- WebDriver objects, 257
- WebElement objects, 257–258
- web scraping
 - bs4 module
 - creating object from HTML, 245–246
 - finding element with select() method, 246–247
 - getting attribute, 248
 - overview, 245
 - downloading
 - files, 239–240
 - images, 251–256
 - pages, 237–238
 - and Google maps project, 234–236
 - and Google search project, 248–251
 - HTML
 - browser developer tools and, 242–243
 - finding elements, 244
 - learning resources, 240
 - overview, 240–241
 - viewing page source, 241–242
- overview, 233–234
- requests module, 237–238
- selenium module
 - clicking buttons, 261
 - finding elements, 257–259
 - following links, 259
 - installing, 256
 - sending special keystrokes, 260–261
 - submitting forms, 259–260
 - using Firefox with, 256–257
- websites, opening from script, 355

- while loops
 - getting and printing mouse coordinates using, 418
 - infinite, 418
 - overview, 45–49
- whitespace, removing, 134–135
- wildcard character (`.`), 160–162
- Windows OS
 - backslash vs. forward slash, 174–175
 - installing Python, 6–7
 - installing third-party modules, 442
 - launching processes from Python, 353
 - logging out of automation program, 414
 - opening files with default applications, 355–356
 - pip tool on, 441–442
 - Python support, 4
 - running Python programs on, 444–445
 - starting IDLE, 7
 - Task Scheduler, 354
- Word documents
 - adding headings, 314–315
 - creating documents with nondefault styles, 310–311
 - format overview, 306–307
 - getting text from, 308–309
 - line/page breaks, 315
 - pictures in, 315–316
 - python-docx module, 306
 - reading, 307–308
 - Run object attributes, 311–312
 - styling paragraphs, 309–310
 - writing to file, 312–314
- Workbook objects, 267
- workbooks, Excel, 266
 - creating worksheets, 278
 - deleting worksheets, 278
 - opening, 267
 - saving, 277
- Worksheet objects, 268
- `write()` method, 183–184
- Writer objects, 322–323
- `writerow()` method, 323

X

- XKCD comics
 - downloading project, 251–256
 - designing program, 252–253
 - downloading web page, 253–254
 - overview, 251–252
 - saving image, 255–256
- multithreaded downloading
 - project, 350–352
 - creating and starting threads, 351–352
 - using `downloadXkcd()` function, 350–351
 - waiting for threads to end, 352

Y

- `%Y` directive, 344
- `%y` directive, 344
- Yahoo! Mail, 363, 367

Z

- zipfile module
 - creating ZIP files, 205–206
 - extracting ZIP files, 205
 - and folders, 209–212
 - overview, 203–204
 - reading ZIP files, 204
- ZipFile objects, 204–205
- ZipInfo objects, 204