Module	Description	Example	Script
core	continue, going on to next loop item	continue	g06/demo.py
core	dictionary, adding a new entry	co[‘po’] = ‘CO’	g05/demo.py
core	dictionary, creating	co = {‘name’:‘Colorado’, ‘capital’:‘Denver’}	g05/demo.py
core	dictionary, creating via comprehension	word_lengths = { w:len(w) for w in wordlist }	g06/demo.py
core	dictionary, iterating through key-value pairs	for w,l in word_lengths.items():	g06/demo.py
core	dictionary, looking up a value	name = ny[‘name’]	g05/demo.py
core	dictionary, making a list of	list1 = [co,ny]	g05/demo.py
core	dictionary, obtaining a list of keys	names = super_dict.keys()	g05/demo.py
core	f-string, grouping with commas	print(f’Total population: {tot_pop:,}’)	g12/demo.py
core	f-string, using a formatting string	print(f”PV of {payment} with T={year} and r={r} is ${p. . .	g08/demo.py
core	file, closing	fh.close()	g02/demo.py
core	file, opening for reading	fh = open(‘states.csv’)	g05/demo.py
core	file, opening for writing	fh = open(filename,“w”)	g02/demo.py
core	file, output using print	print(“It was written during”,year,file=fh)	g02/demo.py
core	file, output using write	fh.write(“Where was this file was written?\n”)	g02/demo.py
core	file, print without adding spaces	print(‘\nOuter:\n’, join_o['_merge'].value_counts(), s. . .	g15/demo.py
core	file, reading one line at a time	for line in fh:	g05/demo.py
core	for, looping through a list	for n in a_list:	g04/demo.py
core	for, looping through a list of tuples	for number,name in div_info:	g14/demo.py
core	function, calling	d1_ssq = sumsq(d1)	g07/demo.py
core	function, calling with an optional argument	sample_function(100, 10, r=0.07)	g08/demo.py
core	function, defining	def sumsq(values: list) -> float:	g07/demo.py
core	function, defining with optional argument	def sample_function(payment:float,year:int,r:float=0.05. . .	g08/demo.py
core	function, returning a result	return values	g07/demo.py
core	function, using type hinting	def readlist(filename: str) -> list:	g07/demo.py
core	if, starting a conditional block	if l == 5:	g06/demo.py
core	if, using an elif statement	elif s.isalpha():	g06/demo.py
core	if, using an else statement	else:	g06/demo.py
core	list, appending an element	a_list.append(“four”)	g03/demo.py
core	list, create via comprehension	cubes = [n**3 for n in a_list]	g04/demo.py

Module	Description	Example	Script
core	list, creating	a_list = [“zero”,“one”,“two”,“three”]	g03/demo.py
core	list, determining length	n = len(b_list)	g03/demo.py
core	list, extending with another list	a_list.extend(a_more)	g03/demo.py
core	list, generating a sequence	b_list = range(1,6)	g04/demo.py
core	list, joining with spaces	a_string = ” “.join(a_list)	g03/demo.py
core	list, selecting an element	print(a_list[0])	g03/demo.py
core	list, selecting elements 0 to 3	print(a_list[:4])	g03/demo.py
core	list, selecting elements 1 to 2	print(a_list[1:3])	g03/demo.py
core	list, selecting elements 1 to the end	print(a_list[1:])	g03/demo.py
core	list, selecting last 3 elements	print(a_list[-3:])	g03/demo.py
core	list, selecting the last element	print(a_list[-1])	g03/demo.py
core	list, sorting	c_sort = sorted(b_list)	g03/demo.py
core	list, summing	total = sum(numbers)	g06/demo.py
core	math, raising a number to a power	a_cubes.append(n**3)	g04/demo.py
core	math, rounding a number	rounded = round(ratio,2)	g05/demo.py
core	sets, computing difference	print(name_states - pop_states)	g14/demo.py
core	sets, creating	name_states = set(name_data[‘State’])	g14/demo.py
core	sets, of tuples	tset1 = set([(1,2), (2,3), (1,3), (2,3)])	g14/demo.py
core	string, concatenating	name = s1+” “+s2+” “+s3	g02/demo.py
core	string, convert to lower case	lower = [s.lower() for s in wordlist]	g06/demo.py
core	string, convert to title case	new_s = s.title()	g06/demo.py
core	string, converting to an int	value = int(s)	g06/demo.py
core	string, creating	filename = “demo.txt”	g02/demo.py
core	string, finding starting index	mm_start = long_string.find(“mm”)	g06/demo.py
core	string, including a newline character	fh.write(name+“!\n”)	g02/demo.py
core	string, is entirely numeric	if s.isnumeric():	g06/demo.py
core	string, matching a substring	has_ñ = [s for s in lower if “ñ” in s]	g06/demo.py
core	string, matching end	a_end = [s for s in lower if s.endswith(“a”)]	g06/demo.py
core	string, matching multiple starts	ab_start = [s for s in lower if s.startswith(starters)]	g06/demo.py
core	string, matching start	a_start = [s for s in lower if s.startswith(“a”)]	g06/demo.py
core	string, replacing a substring	words = s.replace(“,”,” “).split()	g06/demo.py
core	string, splitting on a comma	parts = line.split(‘,’)	g05/demo.py
core	string, splitting on whitespace	b_list = b_string.split()	g03/demo.py
core	string, stripping blank space	clean = [item.strip() for item in parts]	g05/demo.py

As of exercise g23

Module	Description	Example	Script
core	tuple, creating	starters = (“a”,“b”,“0”)	g06/demo.py
core	type, obtaining for a variable	print(‘\nraw_states is a DataFrame object:’, type(raw_. . .	g10/demo.py
csv	setting up a DictReader object	reader = csv.DictReader(fh)	g09/demo.py
geopandas	drawing a heatmap	near_wv.plot(“mil”,cmap=‘Blues’,legend=True,ax=ax)	g23/demo.py
geopandas	extracting geometry from a geodataframe	wv_geo = wv[‘geometry’]	g23/demo.py
geopandas	importing the module	import geopandas as gpd	g22/demo.py
geopandas	merging data onto a geodataframe	conus = conus.merge(trim,on=‘STATEFP’,how=‘left’,valida. . .	g23/demo.py
geopandas	obtaining coordinates	print(‘Number of points:’, len(wv_geo.exterior.coords). . .	g23/demo.py
geopandas	plot with categorical coloring	sel.plot(‘NAME’,cmap=‘Dark2’,ax=ax1)	g23/demo.py
geopandas	plotting a boundary	syr.boundary.plot(color=‘gray’,linewidth=1,ax=ax1)	g22/demo.py
geopandas	reading a file	syr = gpd.read_file(“tl_2016_36_place-syracuse.zip”)	g22/demo.py
geopandas	reading a shapefile	states = gpd.read_file(“cb_2019_us_state_500k.zip”)	g23/demo.py
geopandas	testing if rows touch a geometry	touches_wv = conus.touches(wv_geo)	g23/demo.py
geopandas	writing a layer to a geodatabase	conus.to_file(“conus.gpkg”,layer=“states”)	g23/demo.py
json	importing the module	import json	g05/demo.py
json	using to print an object nicely	print(json.dumps(list1,indent=4))	g05/demo.py
matplotlib	axes, adding a horizontal line	ax21.axhline(medians[‘etr’], c=‘r’, ls=‘–’, lw=1)	g13/demo.py
matplotlib	axes, adding a vertical line	ax21.axvline(medians[‘inc’], c=‘r’, ls=‘–’, lw=1)	g13/demo.py
matplotlib	axes, labeling the X axis	ax2.set_xlabel(‘Millions’)	g12/demo.py
matplotlib	axes, labeling the Y axis	ax1.set_ylabel(‘Millions’)	g12/demo.py
matplotlib	axes, turning off a label	ax.set_ylabel(None)	g14/demo.py
matplotlib	colors, xkcd palette	syr.plot(color=‘xkcd:lightblue’,ax=ax1)	g22/demo.py
matplotlib	figure, adding a title	fig2.suptitle(‘Pooled Data’)	g13/demo.py
matplotlib	figure, four panel grid	fig3, axs = plt.subplots(2,2,sharex=True,sharey=True)	g13/demo.py
matplotlib	figure, left and right panels	fig2, (ax21,ax22) = plt.subplots(1,2)	g13/demo.py
matplotlib	figure, saving	fig2.savefig(‘figure.png’)	g12/demo.py
matplotlib	figure, setting the size	fig, axs = plt.subplots(1,2,figsize=(12,6))	g21/demo.py
matplotlib	figure, tuning the layout	fig2.tight_layout()	g12/demo.py
matplotlib	figure, working with a list of axes	for ax in axs:	g21/demo.py
matplotlib	importing pyplot	import matplotlib.pyplot as plt	g12/demo.py
matplotlib	setting the default resolution	plt.rcParams[‘figure.dpi’] = 300	g12/demo.py

Module	Description	Example	Script
matplotlib	using subplots to set up a figure	fig1, ax1 = plt.subplots()	g12/demo.py
pandas	columns, dividing along index	by_day_pct = 100*by_day_use.div(by_day_tot,axis=‘index’...	g18/demo.py
pandas	columns, dividing with explicit alignment	normed2 = 100*states.div(pa_row,axis=‘columns’)	g10/demo.py
pandas	columns, listing names	print(‘\nColumns:’, list(raw_states.columns))	g10/demo.py
pandas	columns, renaming	county = county.rename(columns={‘B01001_001E’:‘pop’})	g11/demo.py
pandas	columns, retrieving one by name	pop = states[‘pop’]	g10/demo.py
pandas	columns, retrieving several by name	print(pop[some_states]/1e6)	g10/demo.py
pandas	dataframe, appending	gen_all = pd.concat([gen_oswego, gen_onondaga])	g16/demo.py
pandas	dataframe, boolean row selection	print(trim[has_AM], “\n”)	g13/demo.py
pandas	dataframe, dropping a column	both = both.drop(columns=’_merge’)	g16/demo.py
pandas	dataframe, dropping duplicates	flood = flood.drop_duplicates(subset=‘TAX_ID’)	g15/demo.py
pandas	dataframe, dropping missing data	merged = geocodes.dropna()	g12/demo.py
pandas	dataframe, finding duplicate records	dups = parcels.duplicated(subset=‘TAX_ID’, keep=False...	g15/demo.py
pandas	dataframe, getting a block of rows via index	sel = merged.loc[number]	g14/demo.py
pandas	dataframe, inner 1:1 merge	join_i = parcels.merge(flood, how=‘inner’, on=“TAX_ID”,...	g15/demo.py
pandas	dataframe, inner join	merged = name_data.merge(pop_data,left_on=“State”,right...	g14/demo.py
pandas	dataframe, left 1:1 merge	join_l = parcels.merge(flood, how=‘left’, on=“TAX_ID”,...	g15/demo.py
pandas	dataframe, left m:1 merge	both = gen_all.merge(plants, how=‘left’, on=’Plant Code...	g16/demo.py
pandas	dataframe, making a copy	trim = trim.copy()	g13/demo.py
pandas	dataframe, melting	long_form = means.reset_index().melt(id_vars=‘month’)	g18/demo.py
pandas	dataframe, outer 1:1 merge	join_o = parcels.merge(flood, how=‘outer’, on=“TAX_ID”,...	g15/demo.py
pandas	dataframe, pivoting	by_day_use = usage.pivot(index=[‘month’,‘day’],columns=...	g18/demo.py
pandas	dataframe, reading zipped pickle format	sample2 = pd.read_pickle(‘sample_pkl.zip’)	g17/demo.py
pandas	dataframe, resetting the index	hourly = hourly.reset_index()	g18/demo.py
pandas	dataframe, right 1:1 merge	join_r = parcels.merge(flood, how=‘right’, on=“TAX_ID”,...	g15/demo.py
pandas	dataframe, saving in zipped pickle format	sample.to_pickle(‘sample_pkl.zip’)	g17/demo.py
pandas	dataframe, selecting rows by list indexing	print(low_to_high[-5:])	g10/demo.py
pandas	dataframe, selecting rows via boolean	dup_rec = flood[dups]	g15/demo.py
pandas	dataframe, selecting rows via query	trimmed = county.query(“state ==‘04’ or state == ‘36’ ”)	g11/demo.py
pandas	dataframe, selective drop of missing data	trim = demo.dropna(subset=“Days”)	g13/demo.py
pandas	dataframe, set index keeping the column	states = states.set_index(‘STUSPS’,drop=False)	g23/demo.py
pandas	dataframe, shape attribute	print(‘number of rows, columns:’, conus.shape)	g23/demo.py
pandas	dataframe, sorting by a column	county = county.sort_values(‘pop’)	g11/demo.py
pandas	dataframe, sorting by index	summary = summary.sort_index(ascending=False)	g16/demo.py
pandas	dataframe, summing a boolean	print(‘\nduplicate parcels:’, dups.sum())	g15/demo.py

Module	Description	Example	Script
pandas	dataframe, summing across columns	by_day_tot = by_day_use.sum(axis=‘columns’)	g18/demo.py
pandas	dataframe, unstacking an index level	bymo = bymo.unstack(‘month’)	g18/demo.py
pandas	dataframe, using a multilevel column index	means = grid[‘mean’]	g21/demo.py
pandas	dataframe, using xs to select a subset	print(county.xs(‘04’,level=‘state’))	g11/demo.py
pandas	dataframe, using xs with columns	c1 = grid.xs(‘c1’,axis=‘columns’,level=1)	g21/demo.py
pandas	dataframe, writing to a CSV file	merged.to_csv(‘demo-merged.csv’)	g14/demo.py
pandas	datetime, building via to_datetime()	date = pd.to_datetime(recs[‘ts’])	g15/demo.py
pandas	datetime, building with a format	ymd = pd.to_datetime(sample[‘TRANSACTION_DT’], format=. . .	g17/demo.py
pandas	datetime, extracting day attribute	recs[‘day’] = date.dt.day	g15/demo.py
pandas	datetime, extracting hour attribute	recs[‘hour’] = date.dt.hour	g15/demo.py
pandas	general, display information about object	sample.info()	g17/demo.py
pandas	general, displaying all columns	pd.set_option(‘display.max_columns’,None)	g17/demo.py
pandas	general, displaying all rows	pd.set_option(‘display.max_rows’, None)	g10/demo.py
pandas	general, importing the module	import pandas as pd	g10/demo.py
pandas	general, using copy_on_write mode	pd.options.mode.copy_on_write = True	g17/demo.py
pandas	general, using qcut to create deciles	dec = pd.qcut(county[‘pop’], 10, labels=range(1,11))	g11/demo.py
pandas	groupby, cumulative sum within group	cumulative_inc = group_by_state[‘pop’].cumsum()	g11/demo.py
pandas	groupby, descriptive statistics	inc_stats = group_by_state[‘pop’].describe()	g11/demo.py
pandas	groupby, iterating over groups	for t,g in group_by_state:	g11/demo.py
pandas	groupby, median of each group	pop_med = group_by_state[‘pop’].median()	g11/demo.py
pandas	groupby, quantile of each group	pop_25th = group_by_state[‘pop’].quantile(0.25)	g11/demo.py
pandas	groupby, return group number	groups = group_by_state.ngroup()	g11/demo.py
pandas	groupby, return number within group	seqnum = group_by_state.cumcount()	g11/demo.py
pandas	groupby, return rank within group	rank_age = group_by_state[‘pop’].rank()	g11/demo.py
pandas	groupby, select first records	first2 = group_by_state.head(2)	g11/demo.py
pandas	groupby, select largest values	largest = group_by_state[‘pop’].nlargest(2)	g11/demo.py
pandas	groupby, select last records	last2 = group_by_state.tail(2)	g11/demo.py
pandas	groupby, size of each group	num_rows = group_by_state.size()	g11/demo.py
pandas	groupby, sum of each group	state = county.groupby(‘state’)[‘pop’].sum()	g11/demo.py
pandas	index, creating with 3 levels	county = county.set_index([‘state’,‘county’, ‘NAME’])	g11/demo.py
pandas	index, listing names	print(‘\nIndex (rows):’, list(raw_states.index))	g10/demo.py
pandas	index, renaming values	div_pop = div_pop.rename(index=div_names)	g12/demo.py
pandas	index, retrieving a row by name	pa_row = states.loc[‘Pennsylvania’]	g10/demo.py

Module	Description	Example	Script
pandas	index, retrieving first rows by location	print(low_to_high.iloc[0:10])	g10/demo.py
pandas	index, retrieving last rows by location	print(low_to_high.iloc[-5:])	g10/demo.py
pandas	index, setting to a column	states = raw_states.set_index(‘name’)	g10/demo.py
pandas	plotting, bar plot	reg_pop.plot.bar(title=‘Population’,ax=ax1)	g12/demo.py
pandas	plotting, histogram	hh_data[‘etr’].plot.hist(ax=ax1,bins=20,title=’Distribu. . .	g13/demo.py
pandas	plotting, horizontal bar plot	div_pop.plot.barh(title=‘Population’,ax=ax2)	g12/demo.py
pandas	plotting, scatter colored by 3rd var	tidy_data.plot.scatter(ax=ax4,x=‘Income’,y=‘ETR’,c=’typ. . .	g13/demo.py
pandas	plotting, scatter plot	hh_data.plot.scatter(ax=ax21,x=‘inc’,y=‘etr’,title=’ETR. . .	g13/demo.py
pandas	plotting, turning off legend	sel.plot.barh(x=‘Name’,y=‘percent’,ax=ax,legend=None)	g14/demo.py
pandas	reading, csv data	raw_states = pd.read_csv(‘state-data.csv’)	g10/demo.py
pandas	reading, from an open file handle	gen_oswego = pd.read_csv(fh1)	g16/demo.py
pandas	reading, setting index column	state_data = pd.read_csv(‘state-data.csv’,index_col=’na. . .	g12/demo.py
pandas	reading, using dtype dictionary	county = pd.read_csv(‘county_pop.csv’,dtype=fips)	g11/demo.py
pandas	series, RE at start	is_LD = trim[‘Number’].str.contains(r”$^{1\vert}$2”)	g13/demo.py
pandas	series, automatic alignment by index	merged[‘percent’] = 100*merged[‘pop’]/div_pop	g14/demo.py
pandas	series, contains RE or RE	is_TT = trim[‘Days’].str.contains(r”Tu|Th”)	g13/demo.py
pandas	series, contains a plain string	has_AM = trim[‘Time’].str.contains(“AM”)	g13/demo.py
pandas	series, contains an RE	has_AMPM = trim[‘Time’].str.contains(“AM.*PM”)	g13/demo.py
pandas	series, converting strings to title case	fixname = subset_view[‘NAME’].str.title()	g17/demo.py
pandas	series, converting to a list	print(name_data[‘State’].to_list())	g14/demo.py
pandas	series, dropping rows using a list	conus = states.drop(not_conus)	g23/demo.py
pandas	series, element-by-element or	is_either = is_ca | is_tx	g17/demo.py
pandas	series, retrieving an element	print(“\nFlorida’s population:”, pop[‘Florida’]/1e6)	g10/demo.py
pandas	series, sort in decending order	div_pop = div_pop.sort_values(ascending=False)	g12/demo.py
pandas	series, sorting by value	low_to_high = normed[‘med_pers_inc’].sort_values()	g10/demo.py
pandas	series, splitting via RE	trim[‘Split’] = trim[“Time”].str.split(r”:| - | “)	g13/demo.py
pandas	series, splitting with expand	exp = trim[“Time”].str.split(r”:| - | “, expand=True)	g13/demo.py
pandas	series, summing	reg_pop = by_reg[‘pop’].sum()/1e6	g12/demo.py
pandas	series, unstacking	tot_wide = tot_amt.unstack(‘PGI’)	g17/demo.py
pandas	series, using isin()	fixed = flood[‘TAX_ID’].isin(dup_rec[‘TAX_ID’])	g15/demo.py
pandas	series, using value_counts()	print(‘\nOuter:\n’, join_o[’_merge’].value_counts(), s. . .	g15/demo.py
requests	calling the get() method	response = requests.get(api,payload)	g19/demo.py
requests	checking the URL	print(‘url:’, response.url)	g19/demo.py

Module	Description	Example	Script
requests	checking the response text	print(response.text)	g19/demo.py
requests	checking the status code	print(‘status:’, response.status_code)	g19/demo.py
requests	decoding a JSON response	rows = response.json()	g19/demo.py
requests	importing the module	import requests	g19/demo.py
scipy	calling newton’s method	cr = opt.newton(find_cube_root,xinit,maxiter=20,args=[y. . .	g08/demo.py
scipy	importing the module	import scipy.optimize as opt	g08/demo.py
seaborn	adding a title to a grid object	jg.fig.suptitle(‘Distribution of Hourly Load’)	g18/demo.py
seaborn	barplot	hue=‘month’,palette=‘deep’,ax=ax1)	g18/demo.py
seaborn	basic violin plot	sns.violinplot(data=janjul,x=“month”,y=“usage”)	g18/demo.py
seaborn	boxenplot	sns.boxenplot(data=janjul,x=“month”,y=“usage”)	g18/demo.py
seaborn	calling tight_layout on a grid object	jg.fig.tight_layout()	g18/demo.py
seaborn	drawing a heatmapped grid	sns.heatmap(means,annot=True,fmt=“.0f”,cmap=‘Spectral’,. . .	g21/demo.py
seaborn	importing the module	import seaborn as sns	g18/demo.py
seaborn	joint distribution hex plot	jg = sns.jointplot(data=bymo,x=1,y=7,kind=‘hex’)	g18/demo.py
seaborn	line plot	sns.lineplot(data=long_form,x=‘hour’,y=‘value’,hue=’mon. . .	g18/demo.py
seaborn	setting axis titles on a grid object	jg.set_axis_labels(‘January’,‘July’)	g18/demo.py
seaborn	setting the theme	sns.set_theme(style=“white”)	g18/demo.py
seaborn	split violin plot	hue=“month”,palette=‘deep’,split=True)	g18/demo.py
zipfile	importing the module	import zipfile	g16/demo.py
zipfile	opening a file in an archive	fh1 = archive.open(‘generators-oswego.csv’)	g16/demo.py
zipfile	opening an archive	archive = zipfile.ZipFile(‘generators.zip’)	g16/demo.py
zipfile	reading the list of files	print(archive.namelist())	g16/demo.py