Module	Description	Example	Script
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	fips_cols = {col:str for col in fips_vars}	g13/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, using a formatting string	print(f"PV of {payment} with T={year} and r={r} is p	g07/demo.py
core	file, closing	fh.close()	g02/demo.py
core	file, opening for reading	fh = open('states.csv')	${\sf g05/demo.py}$
core	file, opening for writing	fh = open(filename, "w")	g02/demo.py
core	file, output using print	<pre>print("It was written during",year,file=fh)</pre>	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	<pre>print('\nOuter:\n', join_o['_merge'].value_counts(), s</pre>	g14/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:	g13/demo.py
core	function, calling	$d1_ssq = sumsq(d1)$	g06/demo.py
core	function, calling with an optional argument	sample_function(100, 10, r=0.07)	g07/demo.py
core	function, defining	def sumsq(values):	g06/demo.py
core	function, defining with optional argument	<pre>def sample_function(payment,year,r=0.05):</pre>	g07/demo.py
core	function, returning a result	return values	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
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

Module	Description	Example	Script
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	$tot_inc = sum(incomes)$	g08/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	<pre>print(name_states - pop_states)</pre>	g13/demo.py
core	sets, creating	name_states = set(name_data['State'])	g13/demo.py
core	sets, of tuples	tset1 = set([(1,2), (2,3), (1,3), (2,3)])	g13/demo.py
core	string, concatenating	name = $s1+""+s2+""+s3$	g02/demo.py
core	string, converting to an int	values.append(int(line))	g06/demo.py
core	string, creating	filename = "demo.txt"	g02/demo.py
core	string, including a newline character	fh.write(name+"!\n")	g02/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
core	type, obtaining for a variable	<pre>print('\nraw_states is a DataFrame object:', type(raw</pre>	g09/demo.py
CSV	setting up a DictReader object	reader = csv.DictReader(fh)	g08/demo.py
json	importing the module	import json	g05/demo.py
json	using to print an object nicely	<pre>print(json.dumps(list1,indent=4))</pre>	g05/demo.py
matplotlib	axes, adding a horizontal line	$a\times21.a\times$ hline(medians['etr'], c='r', ls='-', lw=1)	g12/demo.py
matplotlib	axes, adding a vertical line	ax21.axvline(medians['inc'], c='r', ls='-', lw=1)	g12/demo.py
matplotlib	axes, labeling the X axis	ax1.set_xlabel('Millions')	g11/demo.py
matplotlib	axes, labeling the Y axis	ax1.set_ylabel("Population, Millions")	g11/demo.py
matplotlib	axes, setting a title	ax1.set_title('Population')	g11/demo.py
matplotlib	axes, turning off the label	ax.set_ylabel(None)	g13/demo.py
matplotlib	figure, adding a title	fig2.suptitle('Pooled Data')	g12/demo.py
matplotlib	figure, four panel grid	fig3, $axs = plt.subplots(2,2,sharex=True,sharey=True)$	g12/demo.py
matplotlib	figure, left and right panels	fig2, (ax21,ax22) = plt.subplots(1,2)	g12/demo.py
matplotlib	figure, saving	fig1.savefig('figure.png')	g11/demo.py

Module	Description	Example	Script
matplotlib	figure, setting the size	fig, axs = plt.subplots $(1,2,figsize=(12,6))$	g20/demo.py
matplotlib	figure, tuning the layout	fig1.tight_layout()	g11/demo.py
matplotlib	figure, working with a list of axes	for ax in axs:	g20/demo.py
matplotlib	importing pyplot	import matplotlib.pyplot as plt	g11/demo.py
matplotlib	setting the default resolution	plt.rcParams['figure.dpi'] = 300	g11/demo.py
matplotlib	using subplots to set up a figure	fig1, ax1 = plt.subplots()	g11/demo.py
pandas	columns, dividing with explicit alignment	normed2 = 100*states.div(pa_row,axis='columns')	g09/demo.py
pandas	columns, listing names	<pre>print('\nColumns:', list(raw_states.columns))</pre>	g09/demo.py
pandas	columns, renaming	county = county.rename(columns={'B01001_001E':'pop'})	g10/demo.py
pandas	columns, retrieving one by name	pop = states['pop']	g09/demo.py
pandas	columns, retrieving several by name	print(pop[some_states]/1e6)	g09/demo.py
pandas	dataframe, appending	gen_all = pd.concat([gen_oswego, gen_onondaga])	g15/demo.py
pandas	dataframe, boolean row selection	print(trim[has_AM], "\n")	g12/demo.py
pandas	dataframe, dropping a column	both = both.drop(columns='_merge')	g15/demo.py
pandas	dataframe, dropping duplicates	flood = flood.drop_duplicates(subset='TAX_ID')	g14/demo.py
pandas	dataframe, dropping missing data	trim = demo.dropna(subset="Days")	g12/demo.py
pandas	dataframe, finding duplicate records	dups = parcels.duplicated(subset='TAX_ID', keep=False	g14/demo.py
pandas	dataframe, getting a block of rows via index	sel = merged.loc[number]	g13/demo.py
pandas	dataframe, inner 1:1 merge	$join_i = parcels.merge(flood,$	g14/demo.py
pandas	dataframe, inner join	merged = name_data.merge(pop_data,left_on="State",right	g13/demo.py
pandas	dataframe, left 1:1 merge	$join_l = parcels.merge(flood,$	g14/demo.py
pandas	dataframe, left m:1 merge	$both = gen_all.merge(plants,$	g15/demo.py
pandas	dataframe, making a copy	trim = trim.copy()	g12/demo.py
pandas	dataframe, outer 1:1 merge	$join_o = parcels.merge(flood,$	g14/demo.py
pandas	dataframe, reading zipped pickle format	sample2 = pd.read_pickle('sample_pkl.zip')	g16/demo.py
pandas	dataframe, resetting the index	hourly = hourly.reset_index()	g17/demo.py
pandas	dataframe, right 1:1 merge	$join_r = parcels.merge(flood,$	g14/demo.py
pandas	dataframe, saving in zipped pickle format	sample.to_pickle('sample_pkl.zip')	g16/demo.py
pandas	dataframe, selecting rows by list indexing	<pre>print(low_to_high[-5:])</pre>	g09/demo.py
pandas	dataframe, selecting rows via boolean	dup_rec = flood[dups]	g14/demo.py
pandas	dataframe, selecting rows via query	trimmed = county.query("state == '04' or state == '36' ")	g10/demo.py
pandas	dataframe, sorting by a column	county = county.sort_values('pop')	g10/demo.py
pandas	dataframe, sorting by index	$summary = summary.sort_index(ascending=False)$	g15/demo.py
pandas	dataframe, summing a boolean	<pre>print('\nduplicate parcels:', dups.sum())</pre>	g14/demo.py
pandas	dataframe, unstacking an index level	bymo = bymo.unstack('month')	g17/demo.py

pandas pandas	dataframe, using a multilevel column index	means = grid['mean']	
nandas		means — grid mean	g20/demo.py
paridas	dataframe, using xs to select a subset	print(county.xs('04',level='state'))	g10/demo.py
pandas	dataframe, using xs with columns	c1 = grid.xs('c1',axis='columns',level=1)	g20/demo.py
pandas	dataframe, writing to a CSV file	merged.to_csv('demo-merged.csv')	g13/demo.py
pandas	datetime, building via to_datetime()	$date = pd.to_datetime(recs[`ts'])$	g14/demo.py
pandas	datetime, building with a format	$ymd = pd.to_datetime(\ sample['TRANSACTION_DT'],\ format{=}.\ \ .$	g16/demo.py
pandas	datetime, extracting day attribute	recs['day'] = date.dt.day	g14/demo.py
pandas	datetime, extracting hour attribute	recs['hour'] = date.dt.hour	g14/demo.py
pandas	general, display information about object	sample.info()	g16/demo.py
pandas	general, displaying all columns	pd.set_option('display.max_columns',None)	g16/demo.py
pandas	general, displaying all rows	pd.set_option('display.max_rows', None)	g09/demo.py
pandas	general, importing the module	import pandas as pd	g09/demo.py
pandas	general, using qcut to create deciles	$dec = pd.qcut(\ county['pop'],\ 10,\ labels = range(1,11)\)$	g10/demo.py
pandas	groupby, cumulative sum within group	<pre>cumulative_inc = group_by_state['pop'].cumsum()</pre>	g10/demo.py
pandas	groupby, descriptive statistics	inc_stats = group_by_state['pop'].describe()	g10/demo.py
pandas	groupby, iterating over groups	for t,g in group_by_state:	${\sf g10/demo.py}$
pandas	groupby, median of each group	<pre>pop_med = group_by_state['pop'].median()</pre>	g10/demo.py
pandas	groupby, quantile of each group	$pop_25th = group_by_state['pop'].quantile(0.25)$	${\sf g10/demo.py}$
pandas	groupby, return group number	$groups = group_by_state.ngroup()$	${\sf g10/demo.py}$
pandas	groupby, return number within group	seqnum = group_by_state.cumcount()	${\sf g10/demo.py}$
pandas	groupby, return rank within group	rank_age = group_by_state['pop'].rank()	g10/demo.py
pandas	groupby, select first records	$first2 = group_by_state.head(2)$	${\sf g10/demo.py}$
pandas	groupby, select largest values	$largest = group_by_state['pop'].nlargest(2)$	${ m g10/demo.py}$
pandas	groupby, select last records	$last2 = group_by_state.tail(2)$	${ m g10/demo.py}$
pandas	groupby, size of each group	num_rows = group_by_state.size()	${\sf g10/demo.py}$
pandas	groupby, sum of each group	state = county.groupby(`state')[`pop'].sum()	g10/demo.py
pandas	index, creating with 3 levels	$county = county.set_index(['state', 'county', 'NAME'])$	g10/demo.py
pandas	index, listing names	<pre>print('\nIndex (rows):', list(raw_states.index))</pre>	g09/demo.py
pandas	index, renaming values	div_pop = div_pop.rename(index=div_names)	g11/demo.py
pandas	index, retrieving a row by name	$pa_row = states.loc['Pennsylvania']$	g09/demo.py
pandas	index, retrieving first rows by location	print(low_to_high.iloc[0:10])	g09/demo.py
pandas	index, retrieving last rows by location	print(low_to_high.iloc[-5:])	g09/demo.py
pandas	index, setting to a column	states = raw_states.set_index('name')	g09/demo.py

	Description	Example	Script
pandas	plotting, bar plot	reg_pop.plot.bar(ax=ax1)	g11/demo.py
pandas pandas	plotting, bar plot plotting, histogram	$hh_data['etr'].plot.hist(ax=ax0,bins=20,title='Distribu.$	g12/demo.py
pandas	plotting, instogram plotting, horizontal bar plot	div_pop.plot.barh(ax=ax1)	g12/demo.py
pandas	plotting, scatter colored by 3rd var	tidy_data.plot.scatter(ax=ax4,x='Income',y='ETR',c='typ	g12/demo.py
pandas	plotting, scatter plot	hh_data.plot.scatter(ax=ax21,x='inc',y='etr',title='ETR	g12/demo.py
pandas	plotting, turning off legend	sel.plot.barh(x='Name',y='percent',ax=ax,legend=None)	g13/demo.py
pandas	reading, csv data	raw_states = pd.read_csv('state-data.csv')	g09/demo.py
pandas	reading, setting index column	state_data = pd.read_csv('state-data.csv',index_col='na	g11/demo.py
pandas	reading, using dtype dictionary	county = pd.read_csv('county_pop.csv',dtype=fips)	g10/demo.py
pandas	series, RE at start	$is_LD = trim['Number'].str.contains(r''^1 2'')$	g12/demo.py
pandas	series, automatic alignment by index	$merged[`percent'] = 100 *merged[`pop'] / div_pop$	g13/demo.py
pandas	series, contains RE or RE	$is_TT = trim['Days'].str.contains(r"Tu Th")$	g12/demo.py
pandas	series, contains a plain string	$has_AM = trim['Time'].str.contains("AM")$	g12/demo.py
pandas	series, contains an RE	$has_AMPM = trim['Time'].str.contains("AM.*PM")$	g12/demo.py
pandas	series, converting strings to title case	<pre>fixname = subset_view['NAME'].str.title()</pre>	g16/demo.py
pandas	series, converting to a list	<pre>print(name_data['State'].to_list())</pre>	g13/demo.py
pandas	series, element-by-element or	$is_either = is_ca \mid is_tx$	${\sf g16/demo.py}$
pandas	series, retrieving an element	<pre>print("\nFlorida's population:", pop['Florida']/1e6)</pre>	g09/demo.py
pandas	series, sort in decending order	$div_pop = div_pop.sort_values(ascending=False)$	g11/demo.py
pandas	series, sorting by value	low_to_high = normed['med_pers_inc'].sort_values()	g09/demo.py
pandas	series, splitting via RE	trim[`Split'] = trim[``Time''].str.split(r'': - ``)	g12/demo.py
pandas	series, splitting with expand	exp = trim[``Time''].str.split(r'': - ``, expand = True)	g12/demo.py
pandas	series, summing	${\sf reg_pop} = {\sf by_reg[`pop']}.{\sf sum()}/1{\sf e6}$	g11/demo.py
pandas	series, unstacking	$tot_wide = tot_amt.unstack('PGI')$	${\sf g16/demo.py}$
pandas	series, using isin()	$fixed = flood['TAX_ID'].isin(dup_rec['TAX_ID'])$	g14/demo.py
pandas	series, using value_counts()	<pre>print('\nOuter:\n', join_o['_merge'].value_counts(), s</pre>	g14/demo.py
requests	calling the get() method	${\sf response} = {\sf requests.get(api,payload)}$	g18/demo.py
requests	checking the URL	print('url:', response.url)	g18/demo.py
requests	checking the response text	<pre>print(response.text)</pre>	g18/demo.py
requests	checking the status code	<pre>print('status:', response.status_code)</pre>	g18/demo.py
requests	decoding a JSON response	rows = response.json()	g18/demo.py
requests	importing the module	import requests	g18/demo.py

Module	Description	Example	Script
scipy	calling newton's method	cr = opt.newton(find_cube_root,xinit,maxiter=20,args=[y	g07/demo.py
scipy	importing the module	import scipy.optimize as opt	g07/demo.py
seaborn	adding a title to a grid object	jg.fig.suptitle('Distribution of Hourly Load')	g17/demo.py
seaborn	barplot	<pre>sns.barplot(data=hourly,x='hour',y='usage',hue='month',</pre>	g17/demo.py
seaborn	basic violin plot	<pre>sns.violinplot(data=janjul,x="month",y="usage")</pre>	g17/demo.py
seaborn	boxenplot	<pre>sns.boxenplot(data=janjul,x="month",y="usage")</pre>	g17/demo.py
seaborn	calling tight_layout on a grid object	jg.fig.tight_layout()	g17/demo.py
seaborn	drawing a heatmapped grid	sns.heatmap(means,annot=True,fmt=".0f",cmap='Spectral',	g20/demo.py
seaborn	importing the module	import seaborn as sns	g17/demo.py
seaborn	joint distribution hex plot	jg = sns.jointplot(data=bymo,x=1,y=7,kind='hex')	g17/demo.py
seaborn	setting axis titles on a grid object	jg.set_axis_labels('January','July')	g17/demo.py
seaborn	setting the theme	sns.set_theme(style="white")	g17/demo.py
seaborn	split violin plot	sns.violinplot(data=eights,x="hour",y="usage",hue="mont	g17/demo.py
zipfile	importing the module	import zipfile	g15/demo.py
zipfile	opening a file in an archive	fh1 = archive.open('generators-oswego.csv')	g15/demo.py
zipfile	opening an archive	archive = zipfile.ZipFile('generators.zip')	g15/demo.py
zipfile	reading the list of files	print(archive.namelist())	g15/demo.py