Severance Chapter 14 Coding Assignment

General Instructions

My expectations for your work on coding assignment exercises will grow as we progress through the course. In addition to applying any new programming techniques that have been covered in the current chapter, I will be expecting you to follow all of the good programming practices that we have adopted in the preceding weeks. Here is a quick summary of good practices that we have covered so far:

- Include a Python Docstring that describes the intent of the program.
- Place your highest-level code in a function named *main*.
- Include a final line of code in the program that executes the *main* function.
- Follow all PEP-8 Python coding style guidelines enforced by the PyCharm Editor. For example, place two blank lines between the code making up a function and the code surrounding that function.
- Choose names for your variables that are properly descriptive.
- Define CONSTANT_VALUES and use them in place of *magic numbers*.
- Always use f-strings for string interpolation and number formatting.
- When processing items from Python lists and tuples, unpack the values into variables with meaningful variable names to avoid using indexed expressions in your code.
- Close all files before the conclusion of the program.
- Remember that your program should behave reasonably when it is not given any input. This might be the result of the user pressing enter at a console prompt. Or, it might be the result of the user providing a an input file that is empty.
- Model your solution after the code that I demonstrate in the tutorial videos.
- Make sure that your test input/output matches the sample provided.
- Create a sub-directory named *data* within your PyCharm project to hold data files.
- Remember to submit all data files with your PyCharm project – including the files that were provided as starter files to this assignment.
- All functions that are not *main()* should have descriptive, action-oriented names.
- All functions should be of reasonable size.
- All functions should have high *cohesion*, and low *coupling*.
- Remember to test your program thoroughly before submitting your work.
- Your code must pass all relevant test cases. Make sure that it passes tests at the boundaries created by *if, else*, and *elif* conditions in your program (boundary value tests).
- Use of the *break* statement is allowed but not encouraged.
- Use of the *continue* statement is forbidden.
- Regular expression patterns should be expressed as Python *raw strings*
- Your finished code must be refactored to meet all good program design practices covered in this course.

- Custom Python classes should be created using Python Dataclasses and follow all practices demonstrated in our course.

Important Note: Do NOT use the Python *numpy* or *pandas* packages

It is possible that you are already aware of the Python *numpy* and *pandas* packages. In this course, we do NOT cover either of these packages. Instead, we are exploring how to create program solutions without them. So, please do NOT include *numpy* or *pandas* in your solutions to these exercises. When grading this assignment, we will be making point deductions for solutions that use either of these packages.

Exercise 1 (Regular)
Create a program named *my_land_mammals.py*. It should be modeled after the program that I demonstrated in *Beyond the Textbook* lecture for this chapter (*my_states.py*). Your program should be different in the following respects:

1. Your program will implement the *LandMammal* class that holds data facts regarding the world's largest land mammals.

2. The LandMammal class should implement the following instance variables:

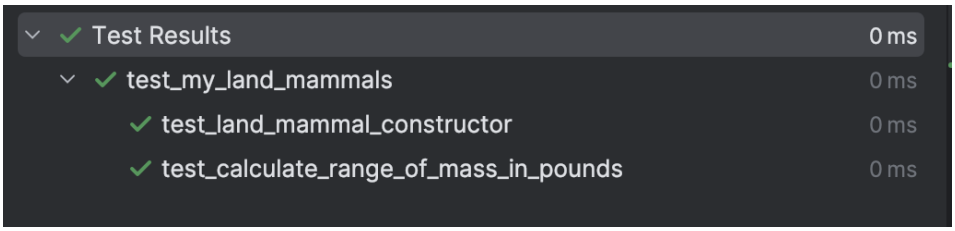
    a. name (str)
    b. minimum_mass_in_pounds (int)
    c. maximum_mass_in_pounds (int)

3. You will also need to implement the following method:

    a. *calculate_range_of_mass_in_pounds*() returns the maximum value minus the minimum value as an int.

4. Your unit testing for this exercise should be implemented using Pytest. Your unit test module should be named *test_my_land_mammals.py*.

When running the Pytest automated unit tests, the output should resemble the following:



Exercise 2 (Regular)
Create a program named *create_land_mammal_mass_reports.py*. It should be modeled after the program that I demonstrated in the tutorial video (*create_state_area_reports.py*). Your program should be different in the following respects:

1. Your program will create a report of LandMammal data facts in two different sort orders:

    a. By Land Mammal Name
    b. By Descending Range of Mass in Pounds

2. You should test your program using manual unit testing. Your program should give expected results when run with the following input files provided as starter files:

    a. empty_file.txt
    b. land_mammals.txt

When running a test with the empty input file, you should expect the following input/output on your console:

```
Please enter input file name: data/empty_file.txt


                        BY LAND MAMMAL NAME

Land Mammal             Minimum Mass   Maximum Mass  Range of Mass
Name                       in Pounds      in Pounds      in Pounds


                BY DESCENDING RANGE OF MASS IN POUNDS

Land Mammal             Minimum Mass   Maximum Mass  Range of Mass
Name                       in Pounds      in Pounds      in Pounds
```

When running a test with the populated input file, you should expect the following input/output on your console:

```
Please enter input file name: data/land_mammals.txt


                        BY LAND MAMMAL NAME

Land Mammal             Minimum Mass   Maximum Mass  Range of Mass
Name                       in Pounds      in Pounds      in Pounds
African elephant              10,000         24,000         14,000
American bison                   700          2,200          1,500
Asian elephant                 8,000         17,640          9,640
Black rhinoceros               1,500          4,000          2,500
Cape buffalo                   1,100          2,200          1,100
Gaur                           1,000          3,000          2,000
Giraffe                        1,544          4,255          2,711
Hippopotamus                   2,500          8,820          6,320
Water buffalo                    660          2,200          1,540
White rhinoceros               3,000          9,920          6,920


                BY DESCENDING RANGE OF MASS IN POUNDS

Land Mammal             Minimum Mass   Maximum Mass  Range of Mass
Name                       in Pounds      in Pounds      in Pounds
African elephant              10,000         24,000         14,000
Asian elephant                 8,000         17,640          9,640
White rhinoceros               3,000          9,920          6,920
Hippopotamus                   2,500          8,820          6,320
Giraffe                        1,544          4,255          2,711
Black rhinoceros               1,500          4,000          2,500
Gaur                           1,000          3,000          2,000
Water buffalo                    660          2,200          1,540
American bison                   700          2,200          1,500
Cape buffalo                   1,100          2,200          1,100
```

Exercise 3 (Regular)
Begin by copying the *my_vehicles.py* module from the starter files. This is the same module that I demonstrated during the tutorial video. As copied from the starter files, it should include implementations of the following classes: *Vehicle, Car, and Truck*.

At the conclusion for this exercise, your *my_vehicles.py* should be changed in the following respects:

1. In addition to the *Car* and *Truck* subclasses, *my_vehicles.py* will also implement the *Motorcycle* subclass.

2. The *Motorcycle* subclass will provide the following distinguishing instance variable:

a. *displacement_in_ccs* (int)

3. The *Motorcycle* subclass will provide an implementation for the following method:

a. *determine_annual_registration_fee*() returns float.

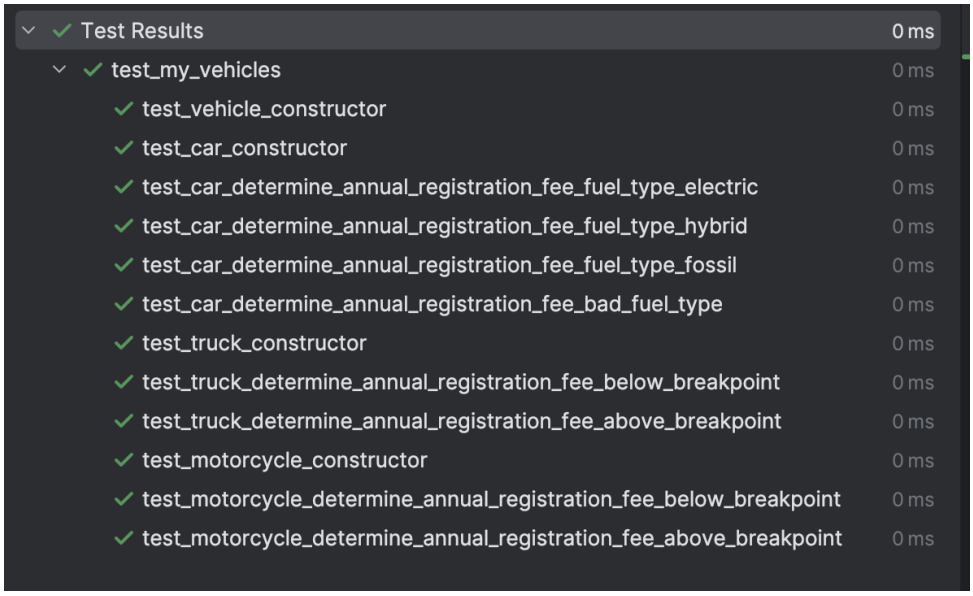
If *displacement_in_ccs* is less than 1,000, then the annual fee is 75.00. Otherwise, the annual fee is 150.00.

The code that you create during this exercise should be tested using Pytest. Begin by copying the *test_my_vehicles.py modules from the starter files.* This is the same test module that I demonstrated during the tutorial video. As copied from the starter files, it should include unit test cases for the following classes: *Vehicle, Car, and Truck*.

At the conclusion for this exercise, your *test_my_vehicles.py* should be changed in the following respects:

1. It should include Pytest unit test cases for the *Motorcycle* subclass.

When running the Pytest automated unit tests in *test_my_vehicles.py*, the output should resemble the following:



Exercise 4 (Regular)
Begin by copying the *create_vehicle_registration_invoices.py* module from the starter files. This is the same module that I demonstrated during the tutorial video. As copied from the starter files, this program should support invoice creation for cars and trucks.

In this exercise, you will modify *create_vehicle_registration_invoices.py* to support the following requirements:

1. In addition to creating registration invoices for cars and trucks, your program should also create registration invoices motorcycles.

2. Your program should give expected results when run with the following input files provided as starter files:

    a. empty_file.txt
    b. car_truck_motorcycle_and_snowmobile_records.txt
    c. car_truck_and_motorcycle_records.txt

When running a test with the empty input file, you should expect the following input/output on your console:

```
Please enter the input filename: data/empty_file.txt


-------------------------------------------


0 invoices have been printed.
```

When running a test with the file that contains unexpected vehicle types, you should expect the following input/output on your console:

```
Please enter the input filename:
data/car_truck_motorcycle_and_snowmobile_records.txt
Traceback (most recent call last):
  File
"/Users/trainor1/____my_python_course_projects/trainor_kevin_exercises_s
everance_chapter_14/create_vehicle_registration_invoices.py", line 200,
in <module>
    main()
  File
"/Users/trainor1/____my_python_course_projects/trainor_kevin_exercises_s
everance_chapter_14/create_vehicle_registration_invoices.py", line 19,
in main
    vehicles = get_vehicles()
               ^^^^^^^^^^^^^^
  File
"/Users/trainor1/____my_python_course_projects/trainor_kevin_exercises_s
everance_chapter_14/create_vehicle_registration_invoices.py", line 38,
in get_vehicles
    raise ValueError(f'Car, Truck, or Motorcycle was expected. This line
starts with: {line[0:10]}')
ValueError: Car, Truck, or Motorcycle was expected. This line starts
with: Snowmobile
```

When running a test with the properly populated input file, you should expect the following input/output on your console:

```
Please enter the input filename:
data/car_truck_and_motorcycle_records.txt


-------------------------------------------

CAR REGISTRATION RENEWAL INVOICE

Bella Baker
100 West End Street
Champaign, IL 62609

Make:                   Tesla
Model:                  Model 3
Year:                   2022
Color:                  Blue
Vehicle ID:             CAR4489679911
Fuel Type:              Electric

AMOUNT DUE: $ 100.00


-------------------------------------------

CAR REGISTRATION RENEWAL INVOICE

John Howard
600 Pleasant Circle
Apt A
Champaign, IL 60577

Make:                   Toyota
Model:                  Camry
Year:                   2021
Color:                  White
Vehicle ID:             CAR1074521368
Fuel Type:              Fossil

AMOUNT DUE: $ 300.00


-------------------------------------------

CAR REGISTRATION RENEWAL INVOICE
```

Faith Langdon
335 River Circle
Champaign, IL 61256

Make: Toyota
Model: Corolla
Year: 2021
Color: Red
Vehicle ID: CAR2927528306
Fuel Type: Fossil

AMOUNT DUE: $ 300.00

TRUCK REGISTRATION RENEWAL INVOICE

Joshua Lewis
801 River Court
Apt B
Champaign, IL 62030

Make: Nissan
Model: Titan XD
Year: 2021
Color: Black
Vehicle ID: TRK6602773660
Gross Weight: 11,000

AMOUNT DUE: $ 400.00

TRUCK REGISTRATION RENEWAL INVOICE

Sebastian Lewis
100 Potter Way
Champaign, IL 60143

Make: Ford
Model: Super Duty F-350
Year: 2021
Color: Grey
Vehicle ID: TRK3575913453
Gross Weight: 12,000

AMOUNT DUE: $ 400.00

CAR REGISTRATION RENEWAL INVOICE

Carol Metcalfe
1000 Pleasant Court
Apt C
Champaign, IL 60883

Make:	Nissan
Model:	Altima
Year:	2021
Color:	Grey
Vehicle ID:	CAR8804836953
Fuel Type:	Fossil

AMOUNT DUE: $ 300.00

TRUCK REGISTRATION RENEWAL INVOICE

Michael North
1000 Main Way
Apt C
Champaign, IL 62220

Make:	Ford
Model:	Super Duty F-350
Year:	2021
Color:	White
Vehicle ID:	TRK5168323404
Gross Weight:	12,000

AMOUNT DUE: $ 400.00

MOTORCYCLE REGISTRATION RENEWAL INVOICE

Dylan Paige
800 Center Blvd
Unit D
Champaign, IL 60214

Make: BMW
Model: R1250 GS
Year: 2021
Color: White
Vehicle ID: MCY8266162579
Displacement (CCs): 1,254

AMOUNT DUE: $ 150.00

***** A Large Number of Invoices Have Been Omitted to Save Space *****

MOTORCYCLE REGISTRATION RENEWAL INVOICE

Dominic Mackay
750 Center Blvd
Waukegan, IL 62374

Make: Royal Enfield
Model: Meteor 350
Year: 2021
Color: Grey
Vehicle ID: MCY5807211506
Displacement (CCs): 349

AMOUNT DUE: $ 75.00

CAR REGISTRATION RENEWAL INVOICE

Tracey Peake
555 High Court
Waukegan, IL 61926

Make: Nissan
Model: Altima
Year: 2021
Color: White
Vehicle ID: CAR2412599457

Fuel Type: Fossil

AMOUNT DUE: $ 300.00

CAR REGISTRATION RENEWAL INVOICE

Wanda Underwood
702 Center Way
Waukegan, IL 61636

Make: Honda
Model: Civic
Year: 2022
Color: White
Vehicle ID: CAR2407296694
Fuel Type: Fossil

AMOUNT DUE: $ 300.00

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86 invoices have been printed.

Exercise 5 (Challenge)
If you decide to submit this challenge exercise, please be aware that this challenge exercise has several parts. The overall objective of the exercise is to support the snowmobile vehicle type. To implement support for snowmobiles, you will need to make further changes to 3 modules:

1. *my_vehicles.py*
2. *test_my_vehicles.py*
3. *create_vehicle_registration_invoices.py*

Do not make new copies of these modules. Instead, modify the modules created in the preceding exercises so that they also support snowmobiles.

Make changes to *my_vehicles.py* to support snowmobiles:

1. In addition to the *Car, Truck, and Motorcycle* subclasses, your program will also implement the *Snowmobile* subclass.

2. The *Snowmobile* subclass will NOT provide a distinguishing instance variable.

3. The *Snowmobile* subclass will provide an implementation for the following method:

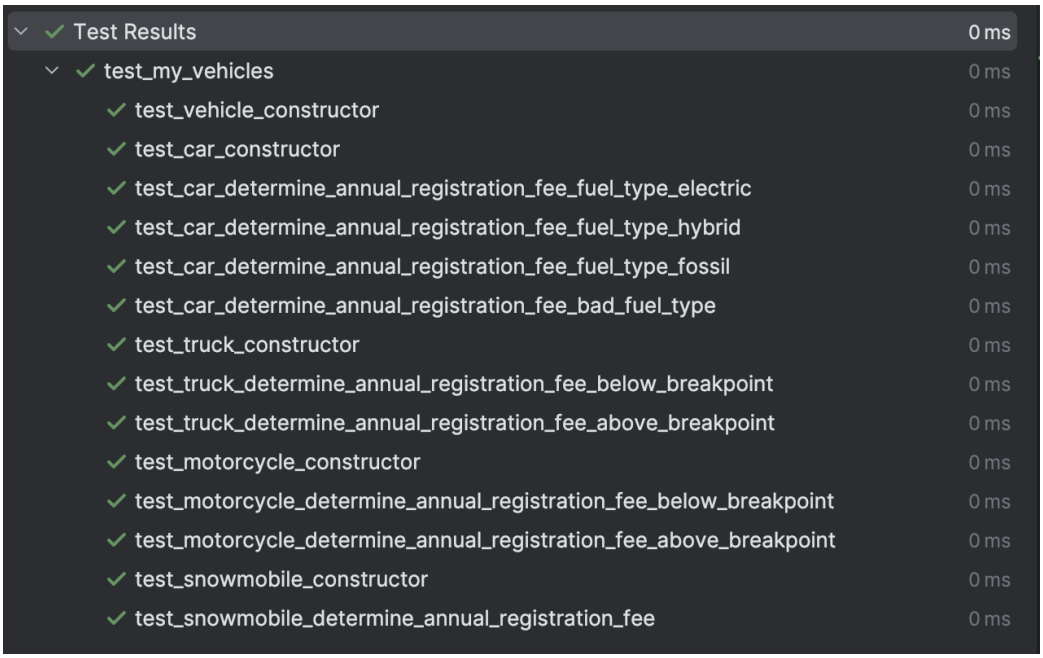
    a. *determine_annual_registration_fee*() returns float.

    The annual fee is always 45.00.

The code changes that you have made to *my_vehicles.py* should be tested using Pytest. At the conclusion for this exercise, your *test_my_vehicles.py* should be changed in the following respects:

1. It should include Pytest unit test cases for the *Snowmobile* subclass.

When running the Pytest automated unit tests in *test_my_vehicles.py*, the output should resemble the following:



Now that the class hierarchy has been expanded to accommodate the snowmobile subtype, your need to modify the *create_vehicle_registration_invoices.py* module to support printing of invoices for snowmobiles. When those changes are complete, proceed to manual unit testing of *create_vehicle_registration_invoices.py.*

When running a test with the empty input file, you should expect the following input/output on your console:

```
Please enter the input filename: data/empty_file.txt


------------------------------------------


0 invoices have been printed.
```

When running a test with input that includes unexpected subtypes, you should expect the following input/output on your console:

```
Please enter the input filename:
data/car_truck_motorcycle_snowmobile_and_arvee_records.txt
Traceback (most recent call last):
  File
"/Users/trainor1/____my_python_course_projects/trainor_kevin_exercises_s
everance_chapter_14/create_vehicle_registration_invoices.py", line 226,
in <module>
    main()
  File
"/Users/trainor1/____my_python_course_projects/trainor_kevin_exercises_s
everance_chapter_14/create_vehicle_registration_invoices.py", line 19,
in main
    vehicles = get_vehicles()
               ^^^^^^^^^^^^^^
  File
"/Users/trainor1/____my_python_course_projects/trainor_kevin_exercises_s
everance_chapter_14/create_vehicle_registration_invoices.py", line 40,
in get_vehicles
    raise ValueError(f'Car, Truck, Motorcycle, or Snowmobile was
expected. This line starts with: {line[0:10]}')
ValueError: Car, Truck, Motorcycle, or Snowmobile was expected. This
line starts with: Arvee,Wall
```

When running a test with the properly populated input file, you should expect the following input/output on your console:

```
Please enter the input filename:
data/car_truck_motorcycle_and_snowmobile_records.txt


-------------------------------------------

CAR REGISTRATION RENEWAL INVOICE

Bella Baker
100 West End Street
Champaign, IL 62609

Make:                   Tesla
Model:                  Model 3
Year:                   2022
Color:                  Blue
Vehicle ID:             CAR4489679911
Fuel Type:              Electric

AMOUNT DUE: $ 100.00


-------------------------------------------

CAR REGISTRATION RENEWAL INVOICE

John Howard
600 Pleasant Circle
Apt A
Champaign, IL 60577

Make:                   Toyota
Model:                  Camry
Year:                   2021
Color:                  White
Vehicle ID:             CAR1074521368
Fuel Type:              Fossil

AMOUNT DUE: $ 300.00


-------------------------------------------

SNOWMOBILE REGISTRATION RENEWAL INVOICE
```

Colin King
800 Brook Circle
Unit C
Champaign, IL 61461

Make: Yamaha
Model: Sidewinder L-TX GT
Year: 2022
Color: White
Vehicle ID: SNW2387865728

AMOUNT DUE: $ 45.00

CAR REGISTRATION RENEWAL INVOICE

Faith Langdon
335 River Circle
Champaign, IL 61256

Make: Toyota
Model: Corolla
Year: 2021
Color: Red
Vehicle ID: CAR2927528306
Fuel Type: Fossil

AMOUNT DUE: $ 300.00

TRUCK REGISTRATION RENEWAL INVOICE

Joshua Lewis
801 River Court
Apt B
Champaign, IL 62030

Make: Nissan
Model: Titan XD
Year: 2021
Color: Black
Vehicle ID: TRK6602773660
Gross Weight: 11,000

AMOUNT DUE: $ 400.00

TRUCK REGISTRATION RENEWAL INVOICE

Sebastian Lewis
100 Potter Way
Champaign, IL 60143

Make:	Ford
Model:	Super Duty F-350
Year:	2021
Color:	Grey
Vehicle ID:	TRK3575913453
Gross Weight:	12,000

AMOUNT DUE: $ 400.00

SNOWMOBILE REGISTRATION RENEWAL INVOICE

Boris Marshall
103 High Circle
Apt A
Champaign, IL 60700

Make:	Ski-Doo
Model:	Summit Edge 850 E-TEC 165
Year:	2022
Color:	Grey
Vehicle ID:	SNW6504064609

AMOUNT DUE: $ 45.00

***** A Large Number of Invoices Have Been Omitted to Save Space *****

MOTORCYCLE REGISTRATION RENEWAL INVOICE

Oliver Cameron
555 Pleasant Circle
Waukegan, IL 61303

Make: Triumph
Model: Trident 660
Year: 2021
Color: Red
Vehicle ID: MCY1042465955
Displacement (CCs): 660

AMOUNT DUE: $ 75.00

MOTORCYCLE REGISTRATION RENEWAL INVOICE

Dominic Mackay
750 Center Blvd
Waukegan, IL 62374

Make: Royal Enfield
Model: Meteor 350
Year: 2021
Color: Grey
Vehicle ID: MCY5807211506
Displacement (CCs): 349

AMOUNT DUE: $ 75.00

SNOWMOBILE REGISTRATION RENEWAL INVOICE

John May
888 Main Blvd
Waukegan, IL 61261

Make: Arctic Cat
Model: ZR 9000 Thundercat
Year: 2021
Color: Blue
Vehicle ID: SNW9112403883

AMOUNT DUE: $ 45.00

SNOWMOBILE REGISTRATION RENEWAL INVOICE

Richard Metcalfe
611 West End Street
Apt B
Waukegan, IL 60838

Make: Polaris
Model: Pro RMK Matryx Slash Patriot Boost 163
Year: 2021
Color: Black
Vehicle ID: SNW5667579989

AMOUNT DUE: $ 45.00

CAR REGISTRATION RENEWAL INVOICE

Tracey Peake
555 High Court
Waukegan, IL 61926

Make: Nissan
Model: Altima
Year: 2021
Color: White
Vehicle ID: CAR2412599457
Fuel Type: Fossil

AMOUNT DUE: $ 300.00

CAR REGISTRATION RENEWAL INVOICE

Wanda Underwood
702 Center Way
Waukegan, IL 61636

Make: Honda
Model: Civic
Year: 2022

Color: White
Vehicle ID: CAR2407296694
Fuel Type: Fossil

AMOUNT DUE: $ 300.00

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100 invoices have been printed.

Tools
Use PyCharm to create and test all Python programs.

Submission Method
Follow the process that I demonstrated in the tutorial video on submitting your work. This involves:

- Locating the properly named directory associated with your project in the file system.
- Compressing that directory into a single .ZIP file using a utility program.
- Submitting the properly named zip file to the submission activity for this assignment.

File and Directory Naming
Please name your Python program files as instructed in each exercise. Please use the following naming scheme for naming your PyCharm project:

```
surname_givenname_exercises_severance_chapter_14
```

If this were my own project, I would name my PyCharm project as follows:

```
trainor_kevin_exercises_severance_chapter_14
```

Use a zip utility to create one zip file that contain the PyCharm project directory. The zip file should be named according to the following scheme:

```
surname_givenname_exercises_severance_chapter_14.zip
```

If this were my own project, I would name the zip file as follows:

```
trainor_kevin_exercises_severance_chapter_14.zip
```

Due By
Please submit this assignment by the date and time shown in the Weekly Schedule.

Last Revised
2025-10-23