05 Checkpoint: Testing Functions

Purpose

Improve your ability to verify the correctness of functions by writing a test function and running it with `pytest`.

Assignment

Write a test function that tests a previously written function. Then use `pytest` to run test functions.

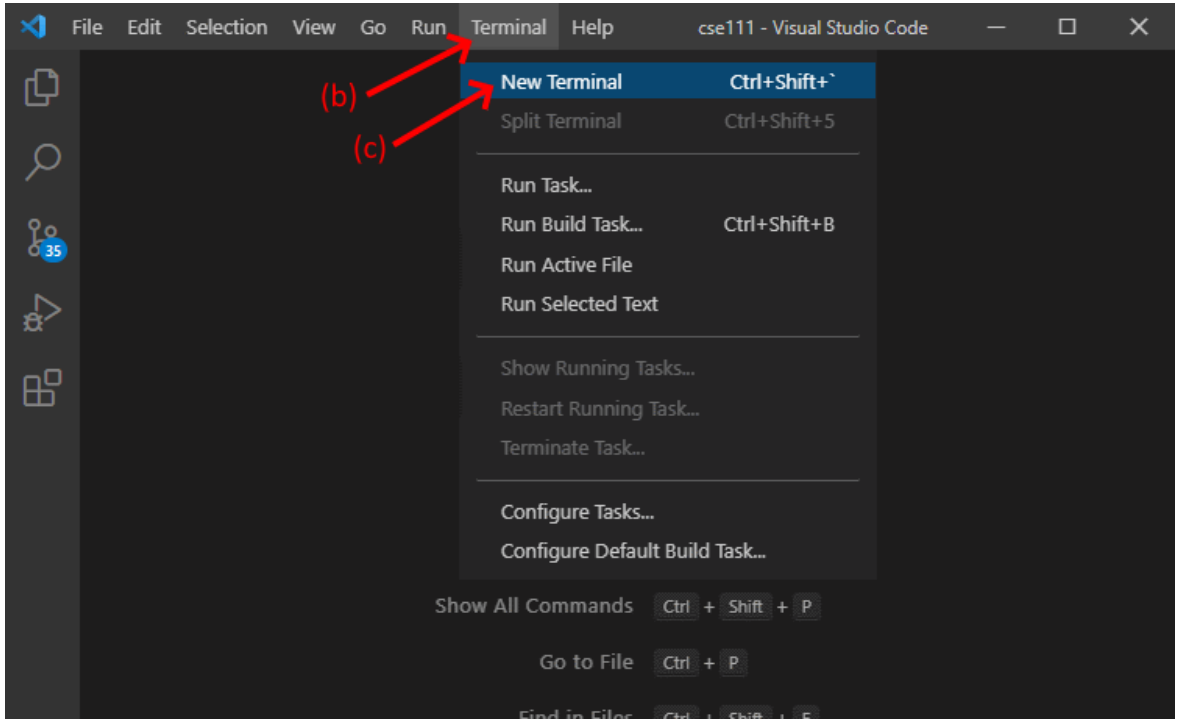
Helpful Documentation

- `pip` is a standard Python module that you can use to download and install third-party modules. During the checkpoint of this lesson, you will use `pip` to download and install `pytest`, so that you can use `pytest` in your test code.
- This video about the `pip` module (16 minutes) shows a BYU-Idaho faculty member using `pip` to install other Python modules.
- The prepare content for this lesson explains how to use `pytest`, `assert`, and `approx` to automatically verify that functions are correct. It also contains an example test function and links to additional documentation about `pytest`.
- This video about test functions (20 minutes) shows a BYU-Idaho faculty member writing two test functions and using `pytest` to run them.

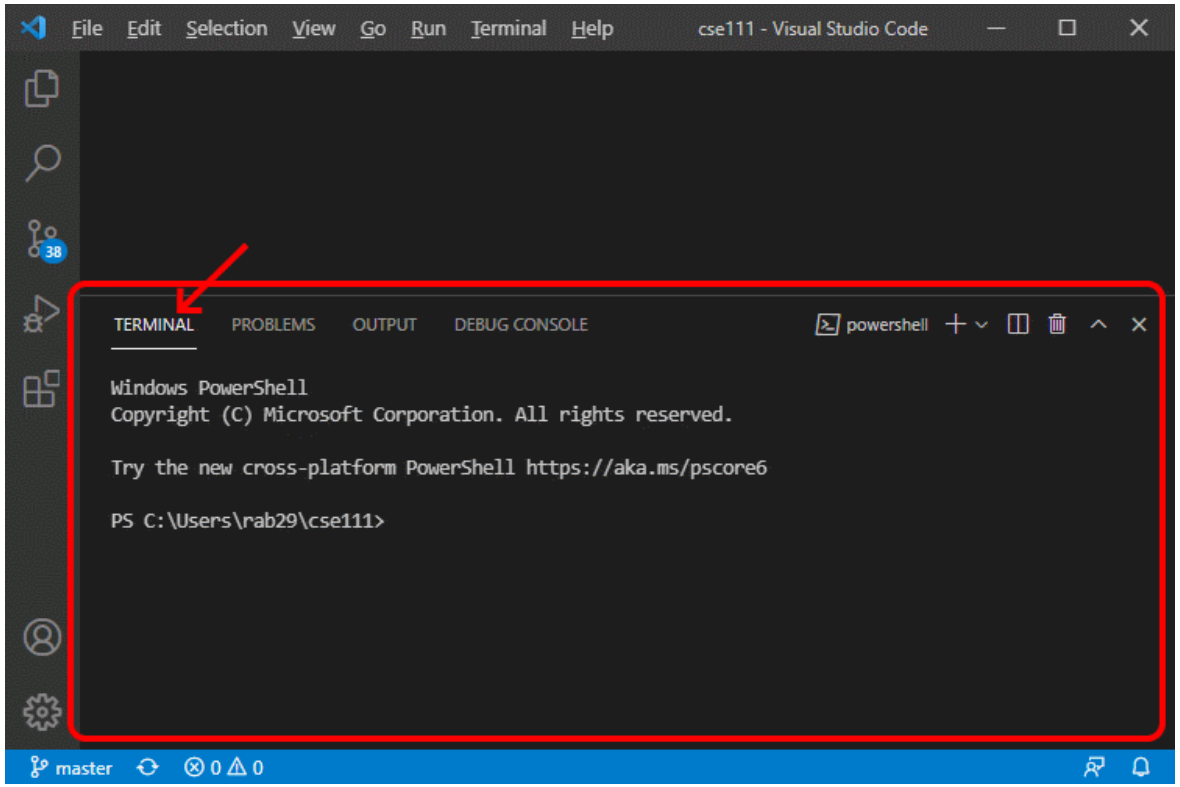
Steps

Do the following:

1. Open a new terminal frame in VS Code by doing the following:
    a. Open VS Code
    b. On the menu bar for VS Code, click "Terminal"
    c. On the menu, click "New Terminal"



This will open a terminal frame at the bottom of the VS Code window. A terminal is a window or frame where a user can type and execute computer commands.



2. Copy and paste the following command into the terminal frame and execute the command by pressing the Enter key. This command will upgrade `pip` and several other parts of the Python installation modules so that `pip` will work correctly.
   - Mac OS users:

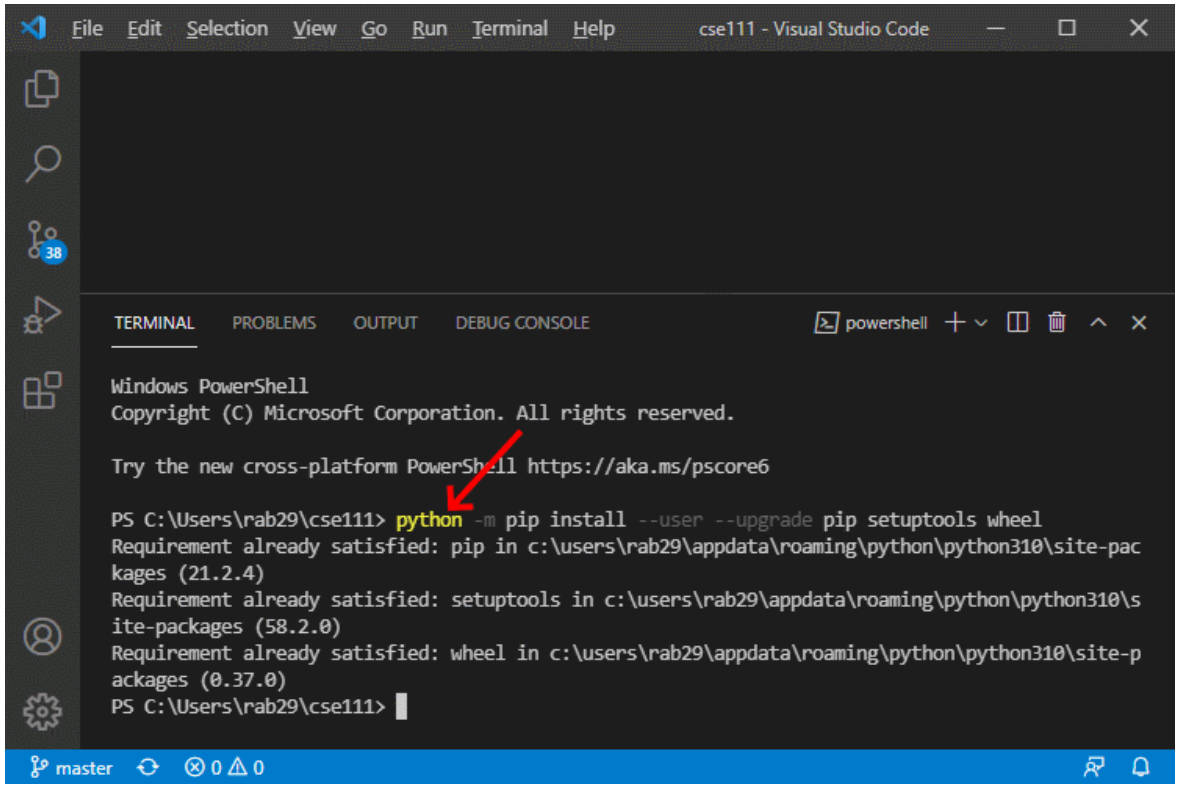
     ```
     python3 -m pip install --user --upgrade pip setuptools wheel
     ```

   - Windows users:

     ```
     python -m pip install --user --upgrade pip setuptools wheel
     ```

     * If your computer is running the Windows operating system, and the above command doesn't work on your computer, try the `py` command instead of the `python` command like this:

```
py -m pip install --user --upgrade pip setuptools wheel
```



3. Install the `pytest` module by copying, pasting, and executing the following command in the terminal frame.
    - Mac OS users:

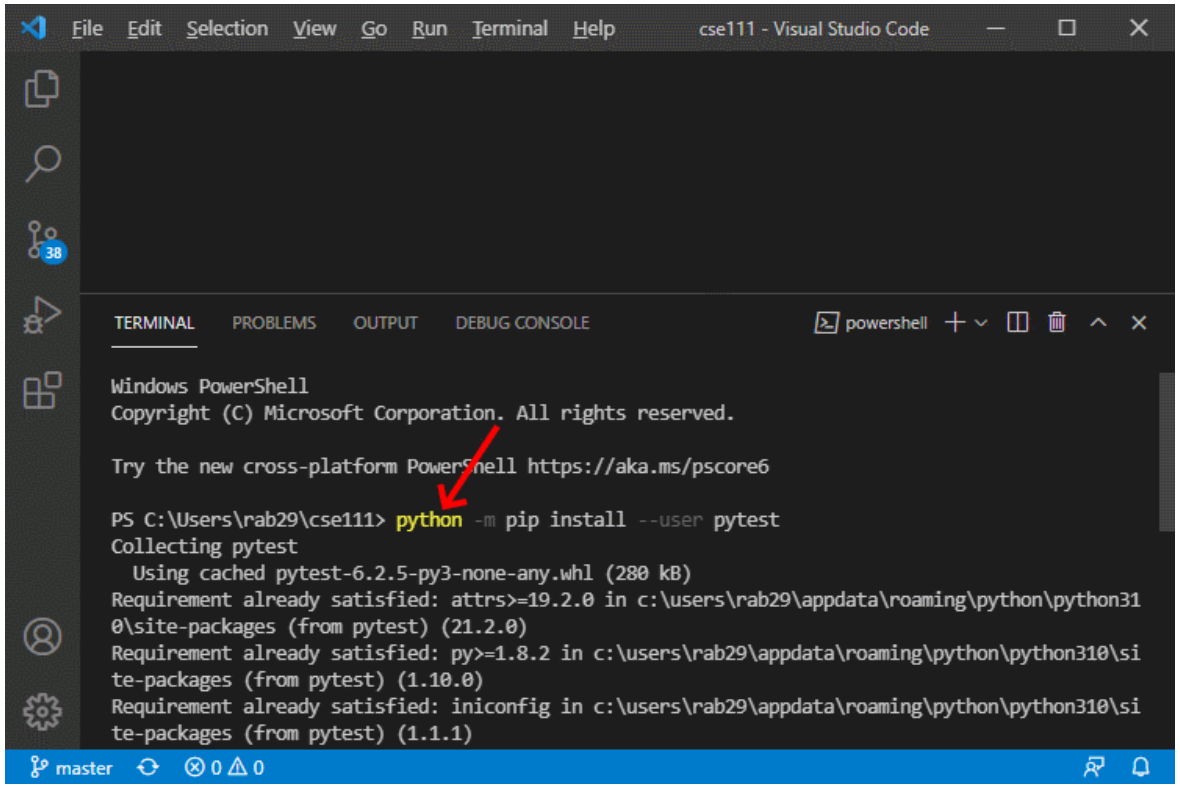
      ```
      python3 -m pip install --user pytest
      ```

    - Windows users:

      ```
      python -m pip install --user pytest
      ```

        * If your computer is running the Windows operating system, and the above command doesn't work on your computer, try the `py` command instead of the `python` command like this:

```
py -m pip install --user pytest
```



4. Download these two Python files: words.py and test_words.py and save them in the same folder.

5. Open the downloaded `words.py` file in VS Code. Notice the `words.py` file contains two small functions named `prefix` and `suffix`. Notice also that each function has a documentation string (a triple quoted string immediately below a function header) that describes what the function does. Read the documentation strings for both functions.

6. Open the downloaded `test_words.py` file in VS Code. In `test_words.py` examine the `test_prefix` function. Notice that it takes no parameters and contains nine `assert` statements. Each assert statement calls the `prefix`

function and then compares the value returned from the `prefix` function to the expected value.

7. In `test_words.py` write a function named `test_suffix` that is similar to the `test_prefix` function. The `test_suffix` function should take no parameters and contain nine `assert` statements that call the `suffix` function with these parameters:

Arguments		Expected Return Value
s1	**s2**	
""	""	""
""	"correct"	""
"clear"	""	""
"angelic"	"awesome"	""
"found"	"profound"	"found"
"ditch"	"itch"	"itch"
"happy"	"funny"	"y"
"tired"	"fatigued"	"ed"
"swimming"	"FLYING"	"ing"

8. Save your `test_words.py` file and run it by clicking the green run icon in VS Code.

Testing Procedure

Verify that your test program works correctly by following each step in this procedure:

1. Run your test program and ensure that your test program's output is similar to the sample run output below.

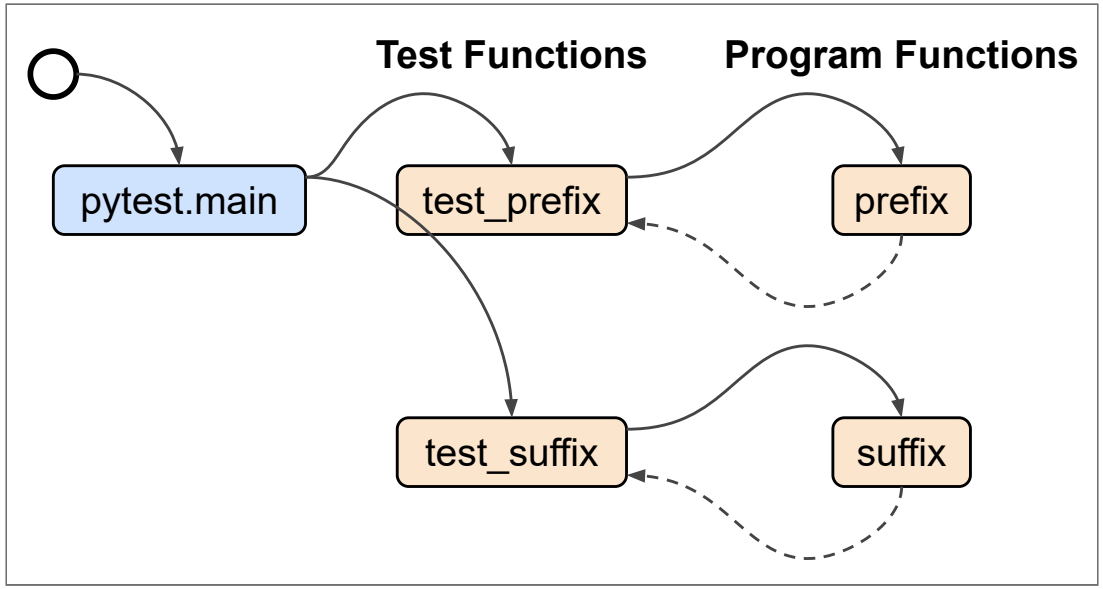
```
> python test_words.py
=================== test session starts ====================
platform win32--Python 3.8.6, pytest-6.1.2, py-1.9.0, pluggy
rootdir: C:\Users\cse111\lesson05
collected 2 items

test_words.py::test_prefix PASSED                      [ 50%]
test_words.py::test_suffix PASSED                      [100%]

==================== 2 passed in 0.09s =====================
```

Sample Solution

When your program is finished, view the sample solution [↓] for this assignment to compare your solution to that one. Before looking at the sample solution, you should work to complete this checkpoint program. However, if you have worked on it for at least an hour and are still having problems, feel free to use the sample solution to help you finish your program.

Call Graph

The following call graph shows the function calls and returns in the sample solution for this assignment. From this call graph we see that the computer starts executing the sample test functions by calling the `pytest.main` function. While executing the `pytest.main` function, the computer calls the `test_prefix` function. While executing the `test_prefix` function, the computer calls the `prefix` function. Then while still executing the `pytest.main` function, the computer calls the `test_suffix` function. While executing the `test_suffix` function, the computer calls the `suffix` function.



Ponder

During this assignment, you downloaded a Python file that contains two program functions named `prefix` and `suffix`. You wrote a test function named `test_suffix` that is similar to the `test_prefix` function that was given to you. You used `pytest` to run both test functions and examined the output of `pytest` to verify that the test functions passed. Because the test functions called `prefix` and `suffix` with many different arguments and verified (using `assert`) that the values returned from `prefix` and `suffix` were correct, we can assume that the `prefix` and `suffix` functions work correctly. Do you think writing and running test functions will help you write better programs?

Submission

When complete, report your progress in the associated I-Learn quiz.