Richer Unit Tests

Test Discovery

To run all tests, you can just write:

```
python3 -m unittest
```

This will locate all test code under the current directory.

This is called **test discovery**.

Restriction: the module/filename **must** start with "test" to be discovered.

To see options, run with `-h`:

```
python3 -m unittest -h
```

Assertions

`TestSplitting` uses the `assertEqual` method.

```python
class TestSplitting(TestCase):
    def test_split_amount(self):
        self.assertEqual([1], split_amount(1, 1))
        self.assertEqual([2, 2], split_amount(4, 2))
        self.assertEqual([2, 2, 1], split_amount(5, 3))
        self.assertEqual([3, 3, 2, 2, 2], split_amount(12, 5))
```

Notice the expected value is always first. Consistency.

You can also make it always second. Just don’t alternate in the same codebase.

Test Output

```
$ python3 -m unittest test_splitting.py
F
======================================================================
FAIL: test_split_amount (test_splitting.TestSplitting)
---------------------------------------
Traceback (most recent call last):
  File "test_splitting.py", line 8, in test_split_amount
    self.assertEqual([2, 2, 1], split_amount(5, 3))
AssertionError: Lists differ: [2, 2, 1] != [2, 1, 1]
First differing element 1:
2
1

- [2, 2, 1]
?     ^
+ [2, 1, 1]
?     ^
---------------------------------------
Ran 1 test in 0.001s
FAILED (failures=1)
```

Other Assertions

There are many different assertion methods. You'll most often use `assertEqual`, `assertNotEqual`, `assertTrue`, and `assertFalse`.

```
class TestDemo(TestCase):
    def test_assertion_types(self):
        self.assertEqual(2, 1 + 1)
        self.assertNotEqual(5, 1 + 1)
        self.assertTrue(10 > 1)
        self.assertFalse(10 < 1)
```

Full list:

https://docs.python.org/3/library/unittest.html#test-cases

assertListEqual()

```
    # In test case:
    self.assertEqual([2, 2, 1], split_amount(5, 3))
```

```
$ python3 -m unittest test_splitting.py
F
======================================================================
FAIL: test_split_amount (test_splitting.TestSplitting)
---------------------------------------
Traceback (most recent call last):
  File "test_splitting.py", line 8, in test_split_amount
    self.assertEqual([2, 2, 1], split_amount(5, 3))
AssertionError: Lists differ: [2, 2, 1] != [2, 1, 1]
First differing element 1:
2
1

- [2, 2, 1]
?     ^
+ [2, 1, 1]
?     ^
---------------------------------------
Ran 1 test in 0.001s
```

Test Methods And Assertions

A single test method will stop at the first failing assertion.

Group related assertions in one test method, and separate other groups into new methods.

```python
class TestSplitting(TestCase):
    def test_split_evenly(self):
        '''split_evenly() splits an integer into the smallest
           number of even groups.'''
        self.assertEqual([2, 2], split_evenly(4))
        self.assertEqual([5], split_evenly(5))
        self.assertEqual([6, 6], split_evenly(12))
        self.assertEqual([5, 5, 5], split_evenly(15))
    def test_split_amount(self):
        self.assertEqual([1], split_amount(1, 1))
        self.assertEqual([2, 2], split_amount(4, 2))
        self.assertEqual([2, 2, 1], split_amount(5, 3))
        self.assertEqual([3, 3, 2, 2, 2], split_amount(12, 5))
```

Test Methods and Failures

```
FF
======================================================================
FAIL: test_split_amount (test_splitting.TestSplitting)
----------------------------------------------------------------------
Traceback (most recent call last):
  File "test_splitting.py", line 12, in test_split_amount
    self.assertEqual([1], split_amount(1, 1))
AssertionError: Lists differ: [1] != []


======================================================================
FAIL: test_split_evenly (test_splitting.TestSplitting)
split_evenly() splits an integer into the smallest # of even groups.
----------------------------------------------------------------------
Traceback (most recent call last):
  File "test_splitting.py", line 7, in test_split_evenly
    self.assertEqual([2, 2], split_evenly(4))
AssertionError: Lists differ: [2, 2] != []


----------------------------------------------------------------------
Ran 2 tests in 0.001s
```

Pinpointing

How do you run just one test method?

```
python3 -m unittest test_module.TestCaseClass.test_method_to_run
```

For example:

```
python3 -m unittest test_splitting.TestSplitting.test_split_amount
```

The argument is:

- test module name,
- TestCase subclass in that module, then
- test method name.

All separated by dots. To run all test methods in a test case, drop the last field:

```
python3 -m unittest test_splitting.TestSplitting
```