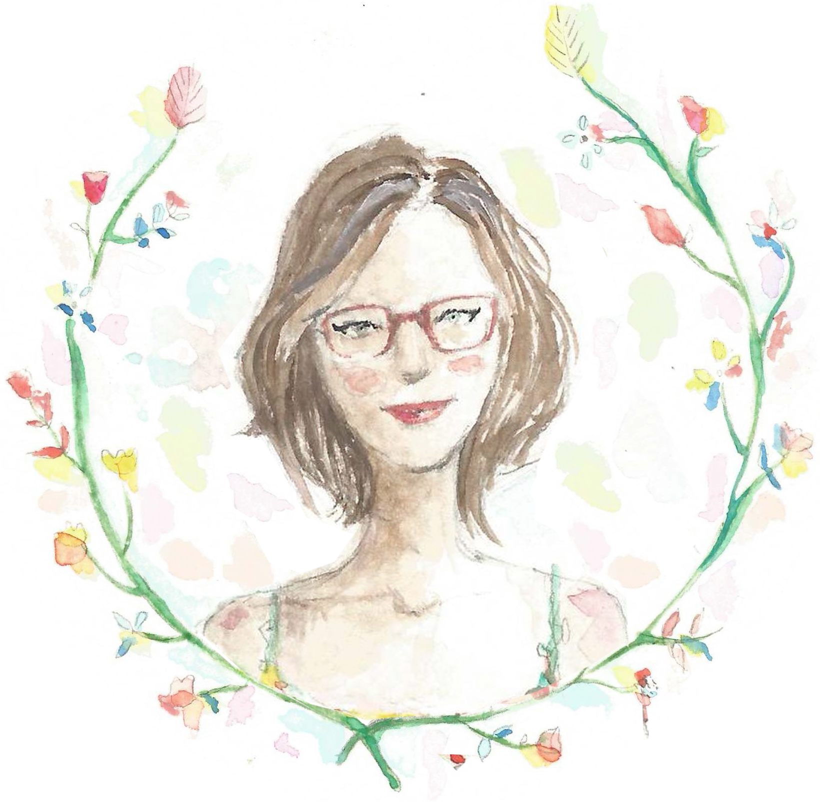
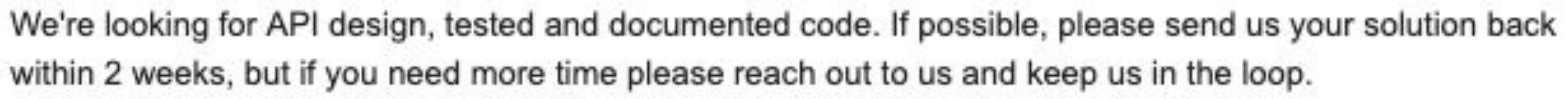
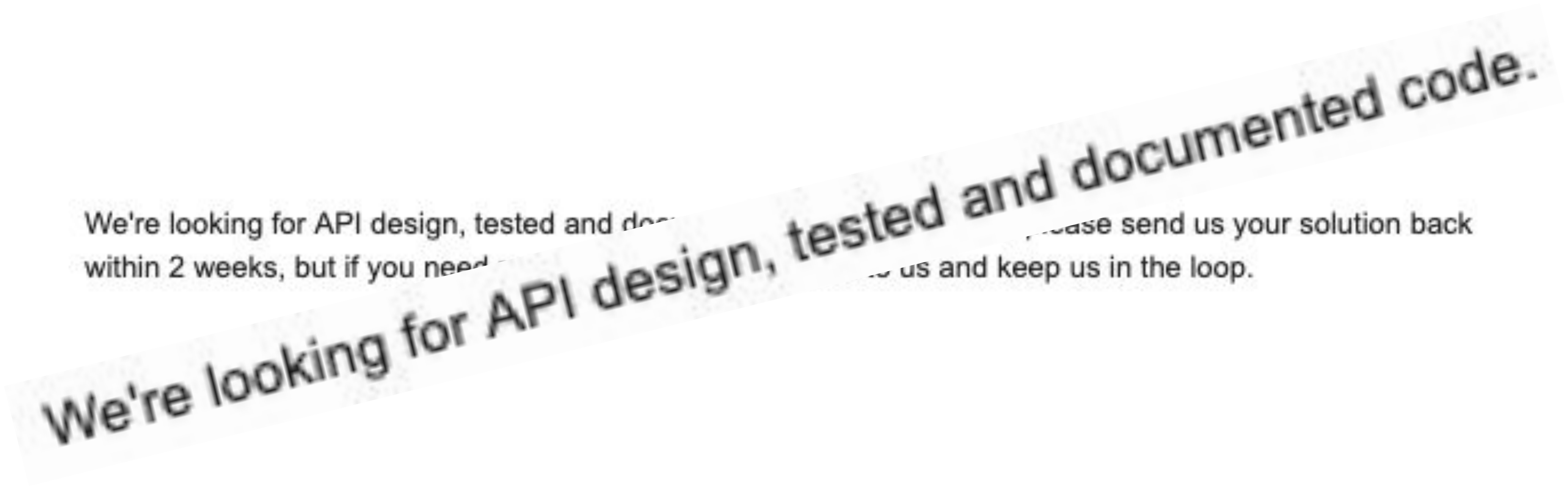
First steps into the testing world of Python

A report on learning Software Testing





We're looking for API design, tested and documented code. If possible, please send us your solution back within 2 weeks, but if you need more time please reach out to us and keep us in the loop.



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Software Testing

what does it mean?

exploratory testing

Repetitive is boring, boring leads to mistakes and makes you look for a different job by the end of the week.

Ham Vocke

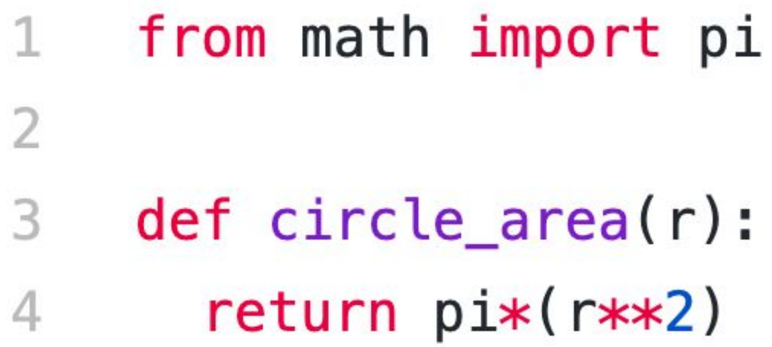
automated testing

where do I start?

unit testing

unittest

circles.py



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from math import pi

def circle_area(r):
    return pi*(r**2)
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circles.py

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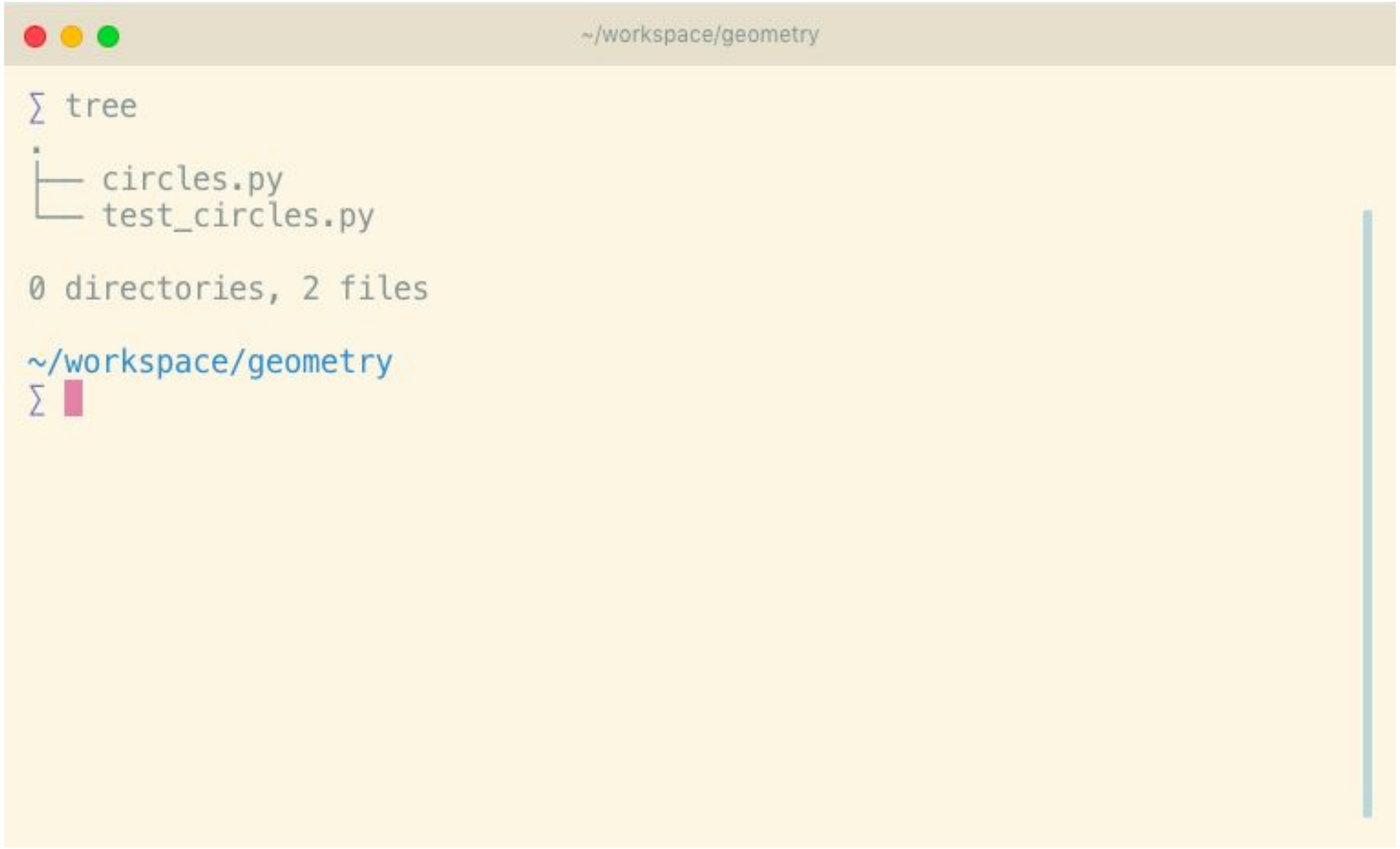

```
~/workspace/geometry

∑ tree
.
├── circles.py
└── test_circles.py

0 directories, 2 files

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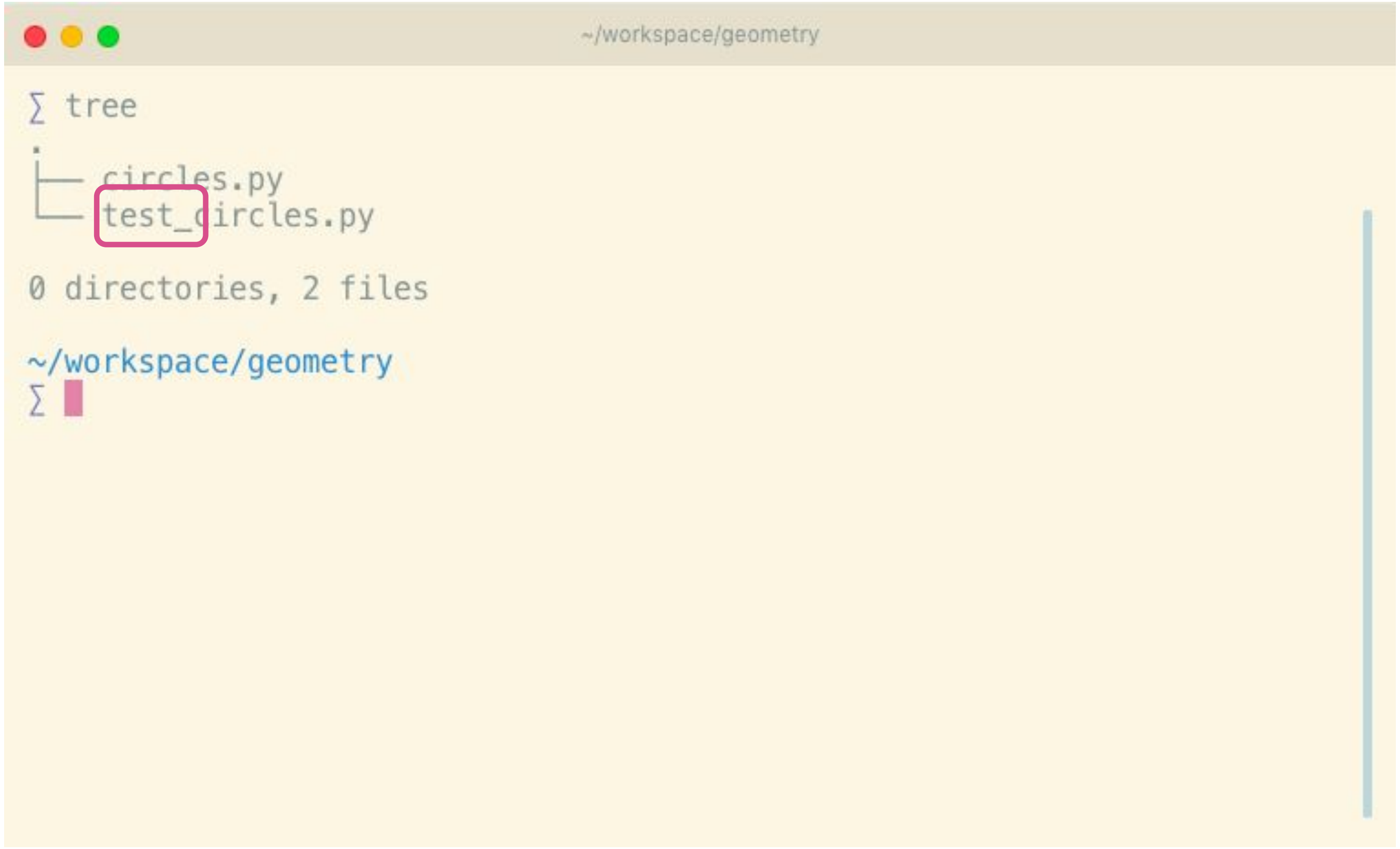
∑ 
```



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what do I test?

Area of circle, using radius

The area of a circle is equal to its radius squared then multiplied by pi.

$$A = \pi(r^{**}2)$$

- ! Radius must be a real number.
- ! Radius cannot be negative.

how do I test?

test_circles.py

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import unittest
from math import pi
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class TestCircleArea(unittest.TestCase):
  def test_area_result(self):
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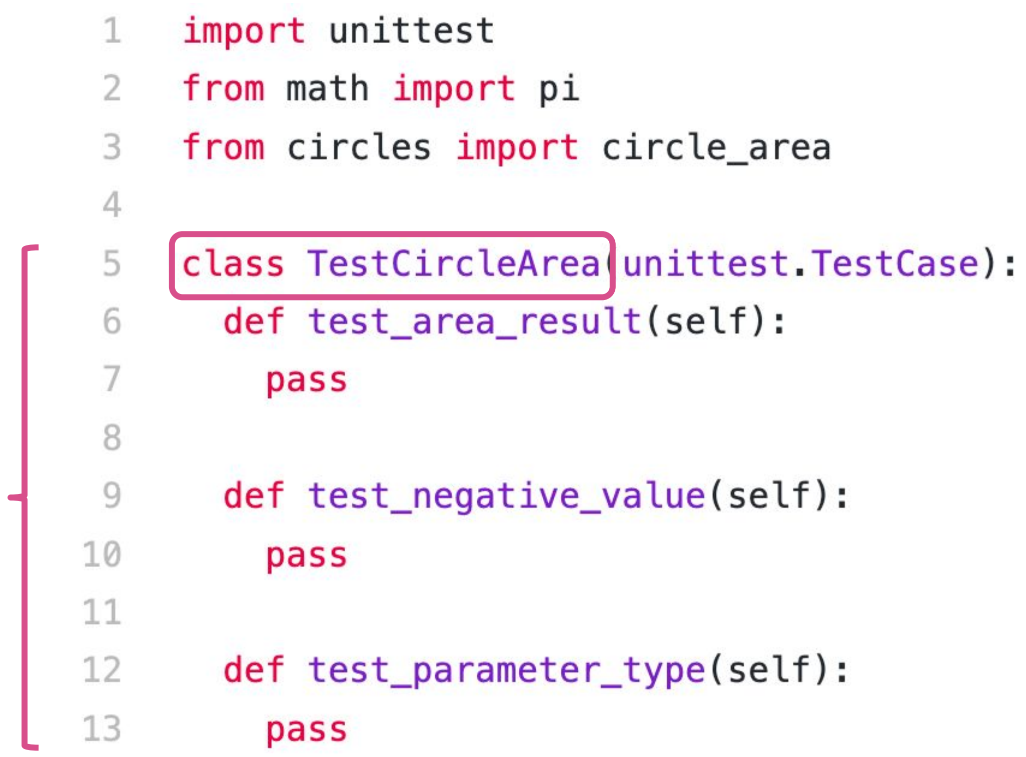

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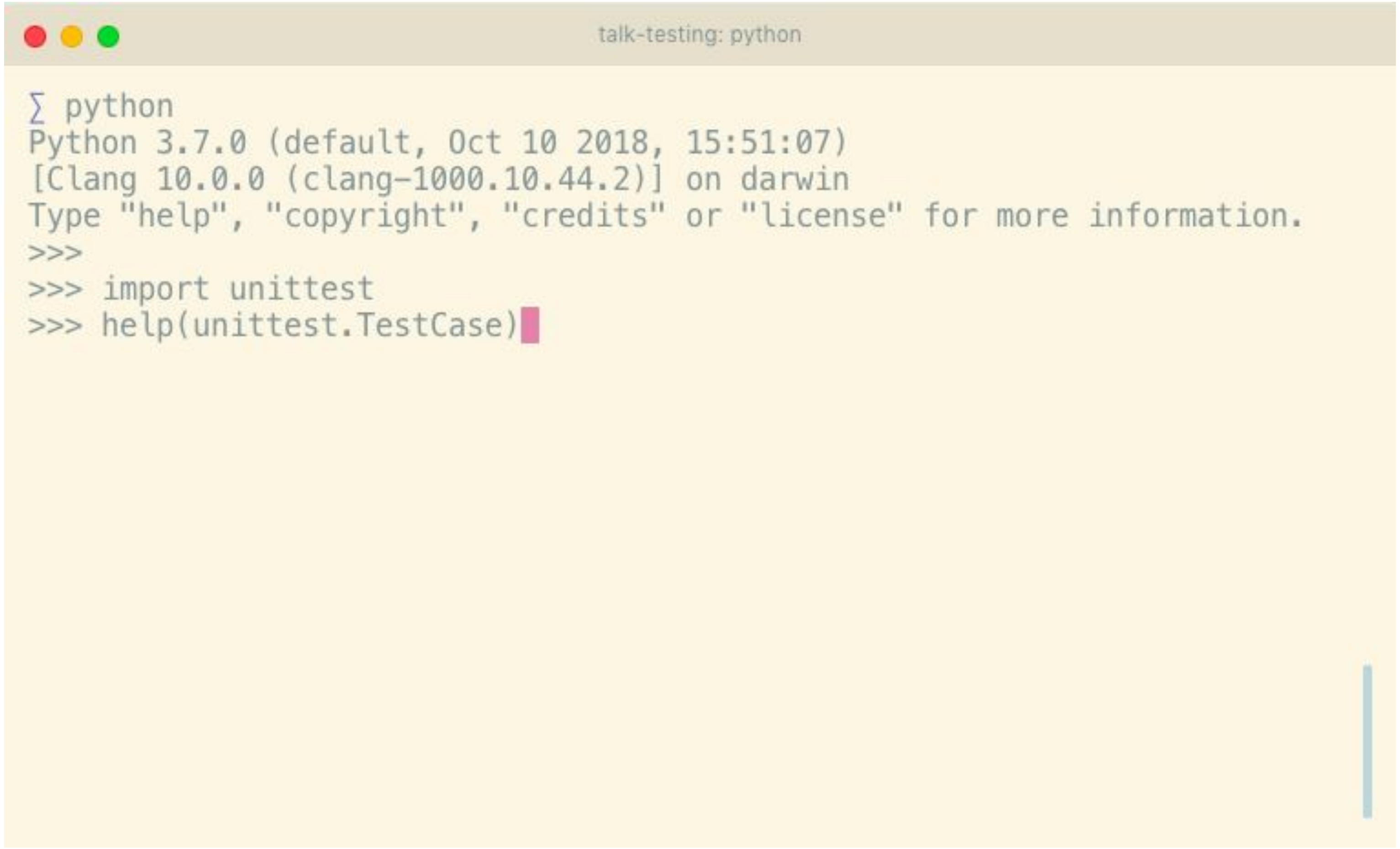
assert



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∑ python
Python 3.7.0 (default, Oct 10 2018, 15:51:07)
[Clang 10.0.0 (clang-1000.10.44.2)] on darwin
Type "help", "copyright", "credits" or "license" for more information.
>>>
>>> import unittest
>>> help(unittest.TestCase)
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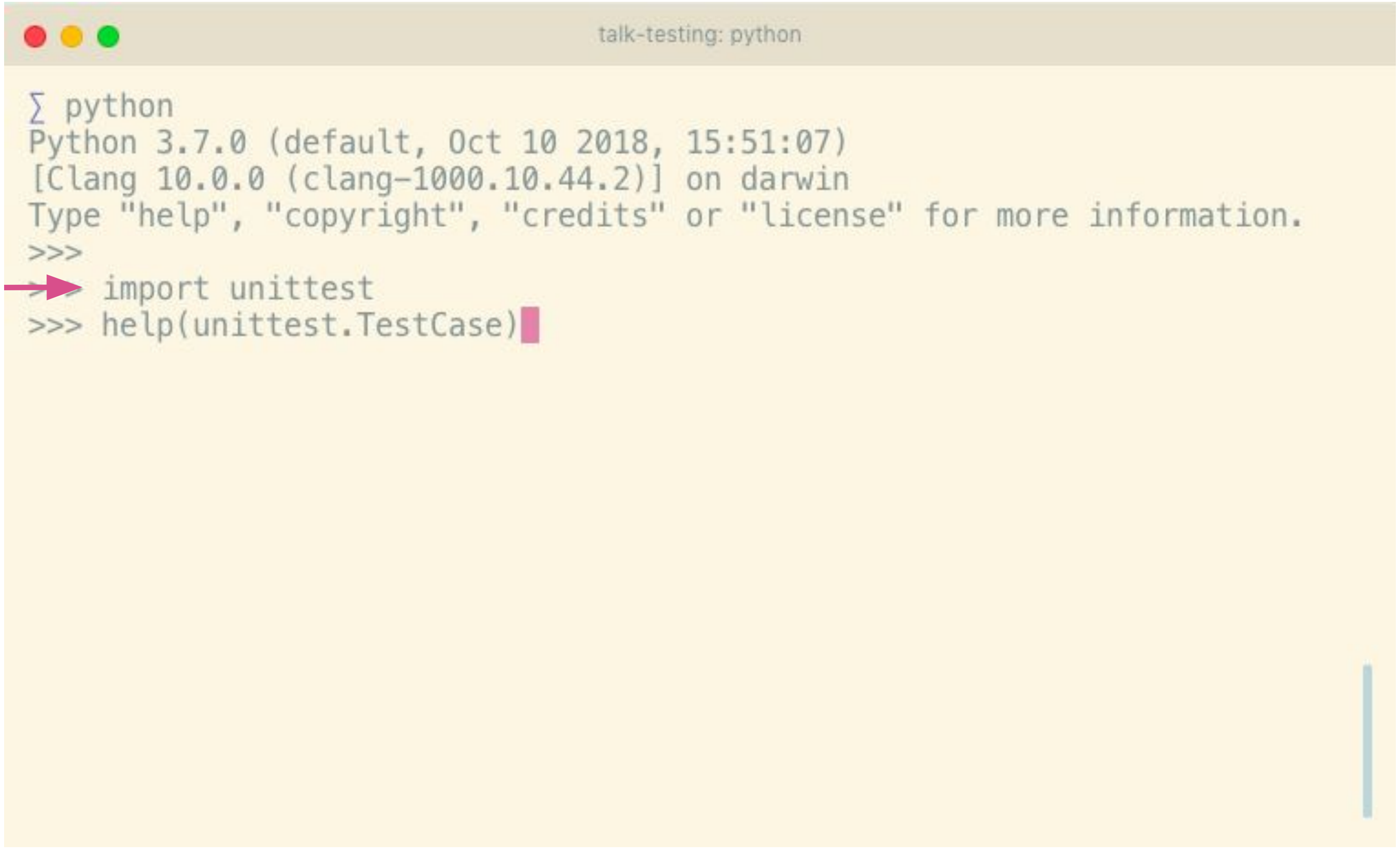

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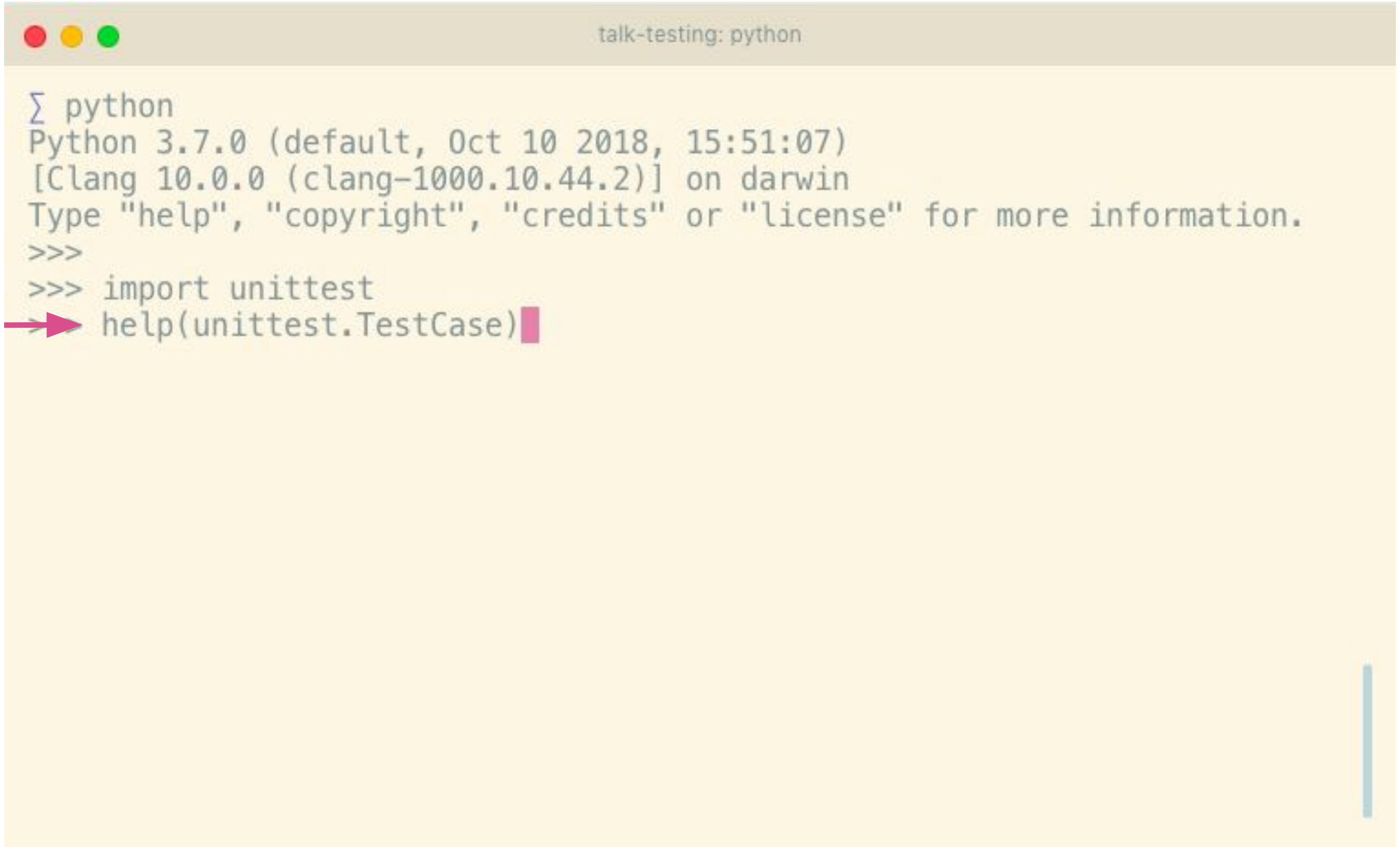

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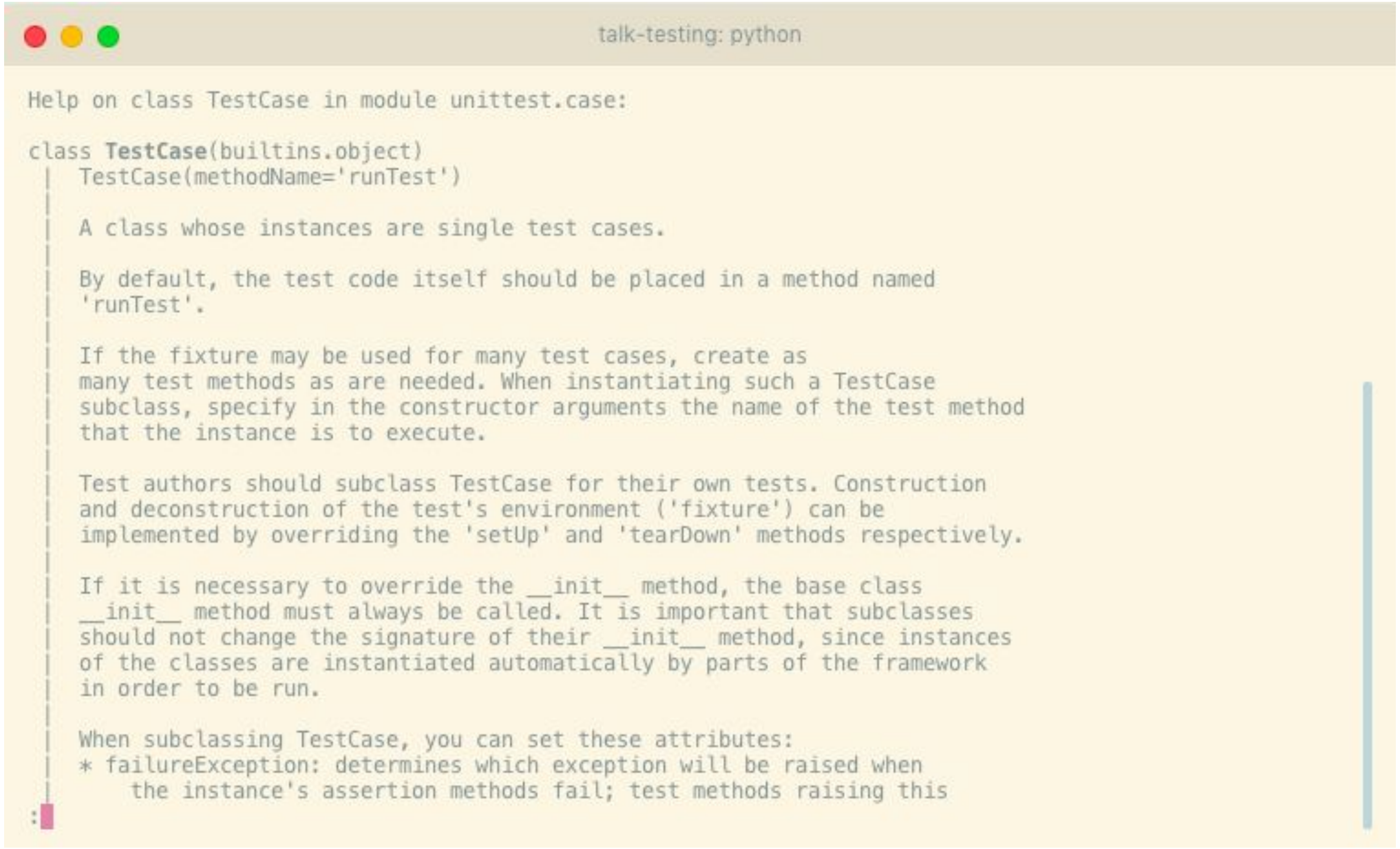
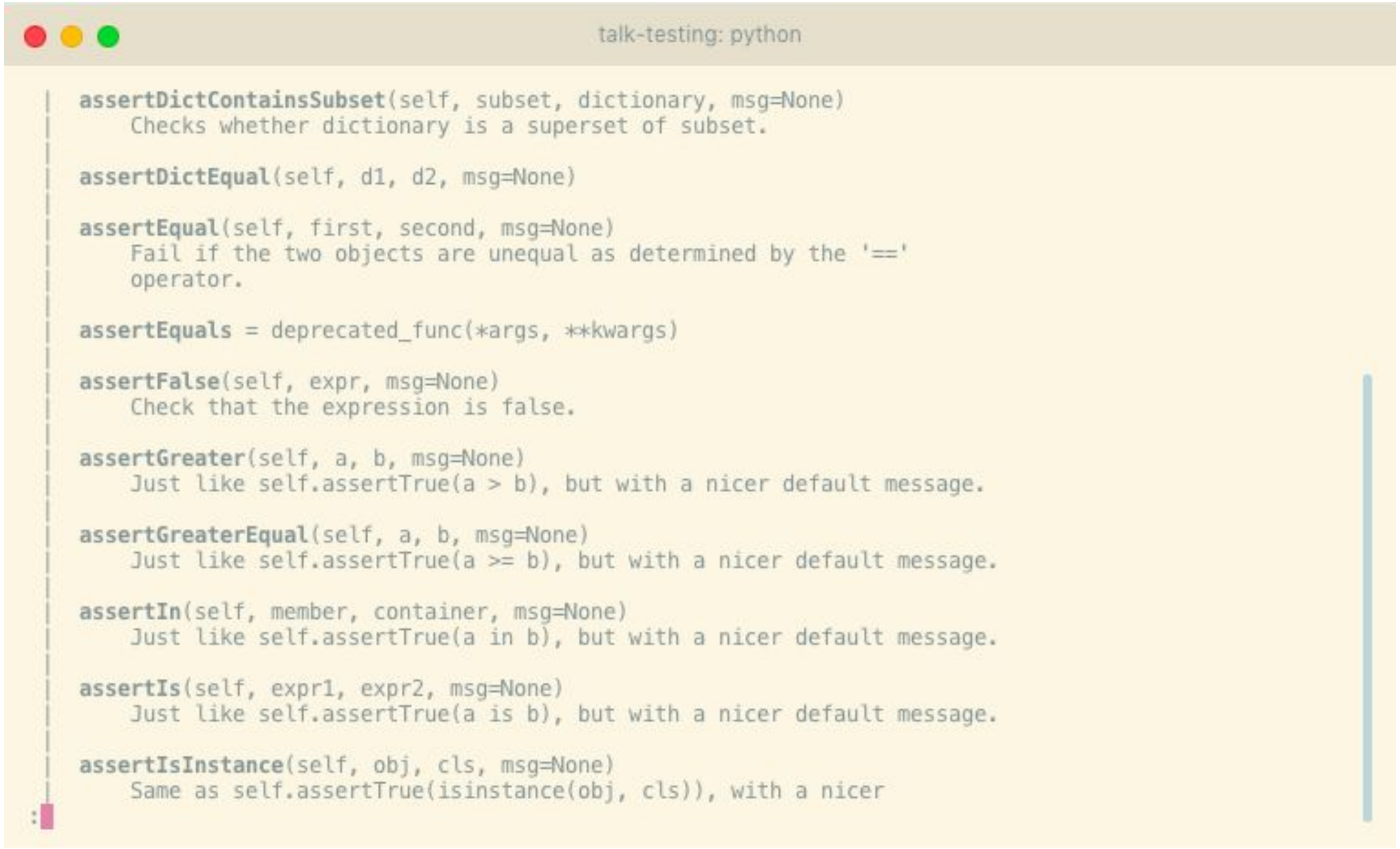


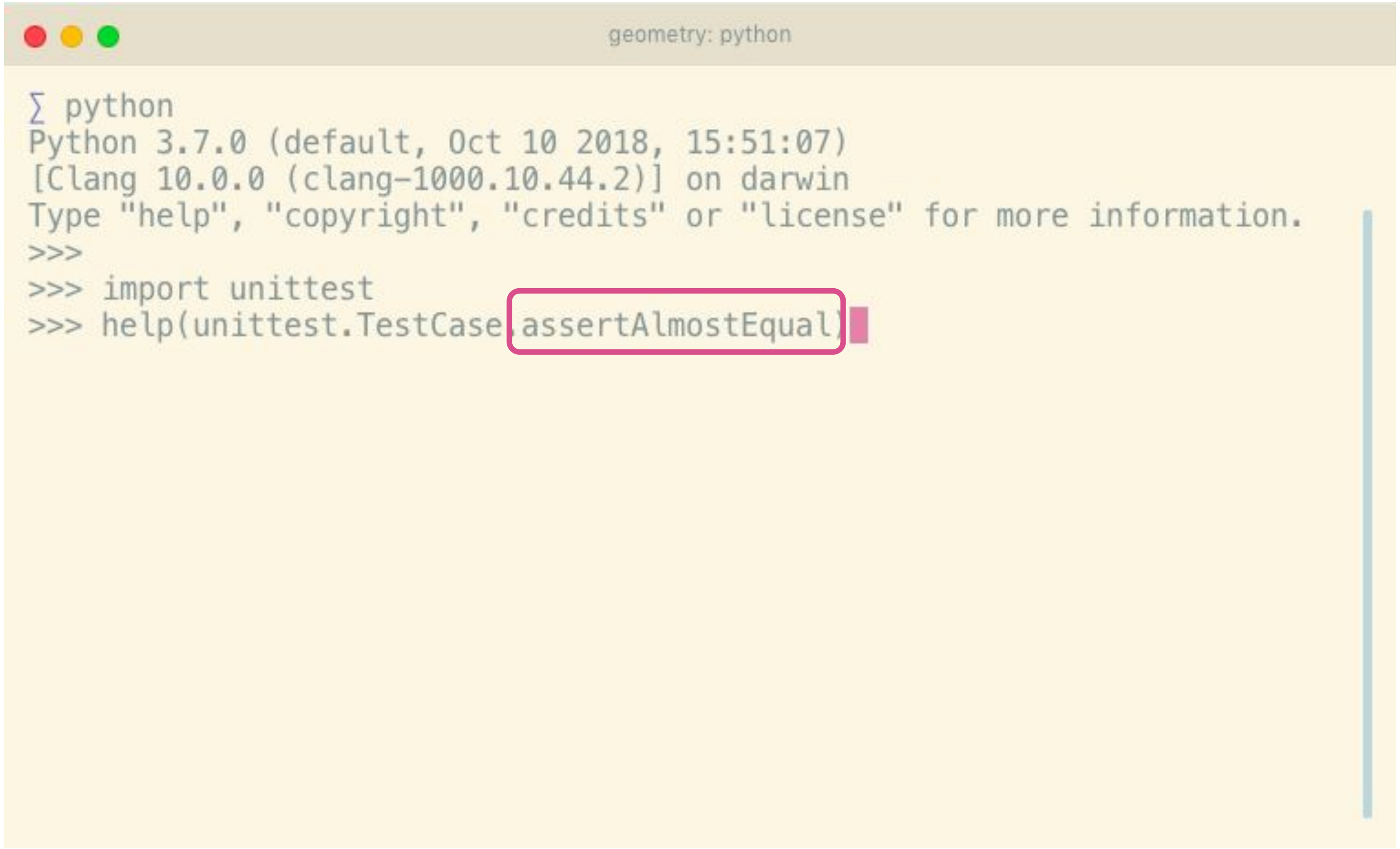
talk-testing: python

```
Help on class TestCase in module unittest.case:

class TestCase(builtins.object)
 |  TestCase(methodName='runTest')
 |
 |  A class whose instances are single test cases.
 |
 |  By default, the test code itself should be placed in a method named
 |  'runTest'.
 |
 |  If the fixture may be used for many test cases, create as
 |  many test methods as are needed. When instantiating such a TestCase
 |  subclass, specify in the constructor arguments the name of the test method
 |  that the instance is to execute.
 |
 |  Test authors should subclass TestCase for their own tests. Construction
 |  and deconstruction of the test's environment ('fixture') can be
 |  implemented by overriding the 'setUp' and 'tearDown' methods respectively.
 |
 |  If it is necessary to override the __init__ method, the base class
 |  __init__ method must always be called. It is important that subclasses
 |  should not change the signature of their __init__ method, since instances
 |  of the classes are instantiated automatically by parts of the framework
 |  in order to be run.
 |
 |  When subclassing TestCase, you can set these attributes:
 |  * failureException: determines which exception will be raised when
 |      the instance's assertion methods fail; test methods raising this
:
```



```
|  assertDictContainsSubset(self, subset, dictionary, msg=None)
|      Checks whether dictionary is a superset of subset.
|
|  assertDictEqual(self, d1, d2, msg=None)
|
|  assertEqual(self, first, second, msg=None)
|      Fail if the two objects are unequal as determined by the '=='
|      operator.
|
|  assertEquals = deprecated_func(*args, **kwargs)
|
|  assertFalse(self, expr, msg=None)
|      Check that the expression is false.
|
|  assertGreater(self, a, b, msg=None)
|      Just like self.assertTrue(a > b), but with a nicer default message.
|
|  assertGreaterEqual(self, a, b, msg=None)
|      Just like self.assertTrue(a >= b), but with a nicer default message.
|
|  assertIn(self, member, container, msg=None)
|      Just like self.assertTrue(a in b), but with a nicer default message.
|
|  assertIs(self, expr1, expr2, msg=None)
|      Just like self.assertTrue(a is b), but with a nicer default message.
|
|  assertIsInstance(self, obj, cls, msg=None)
|      Same as self.assertTrue(isinstance(obj, cls)), with a nicer
:
```



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Type "help", "copyright", "credits" or "license" for more information.
>>>
>>> import unittest
>>> help(unittest.TestCase.assertAlmostEqual)
```

```python
  def test_area_result(self):
    self.assertAlmostEqual(circle_area(1), pi)
    self.assertAlmostEqual(circle_area(0), 0)
    self.assertAlmostEqual(circle_area(2.1), pi * 2.1**2)
    def test_area_result(self):
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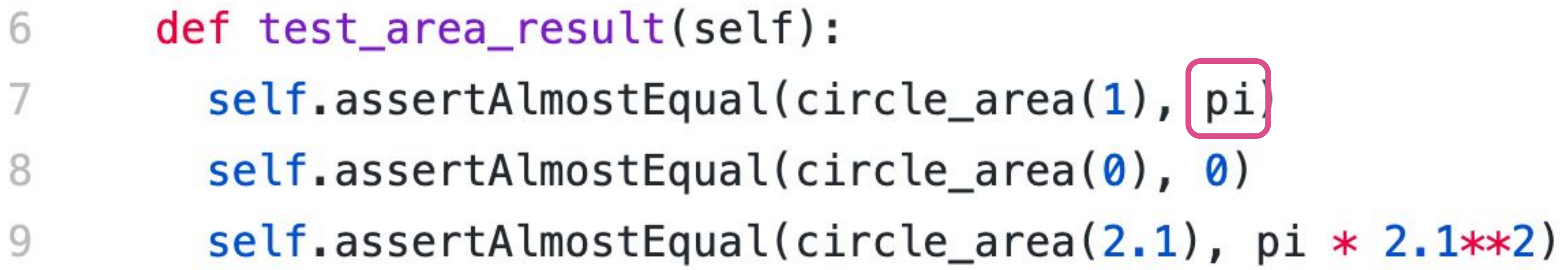

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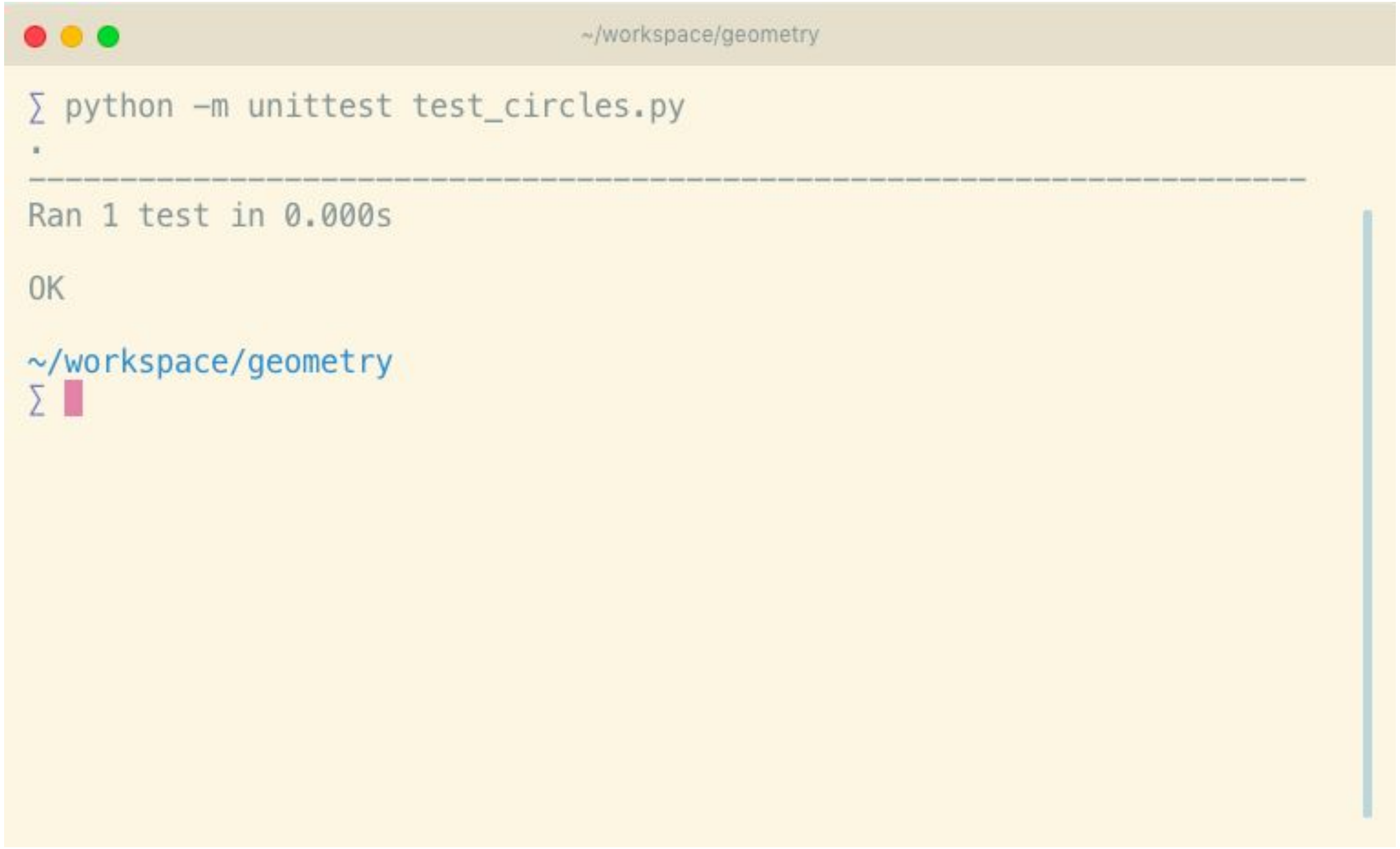
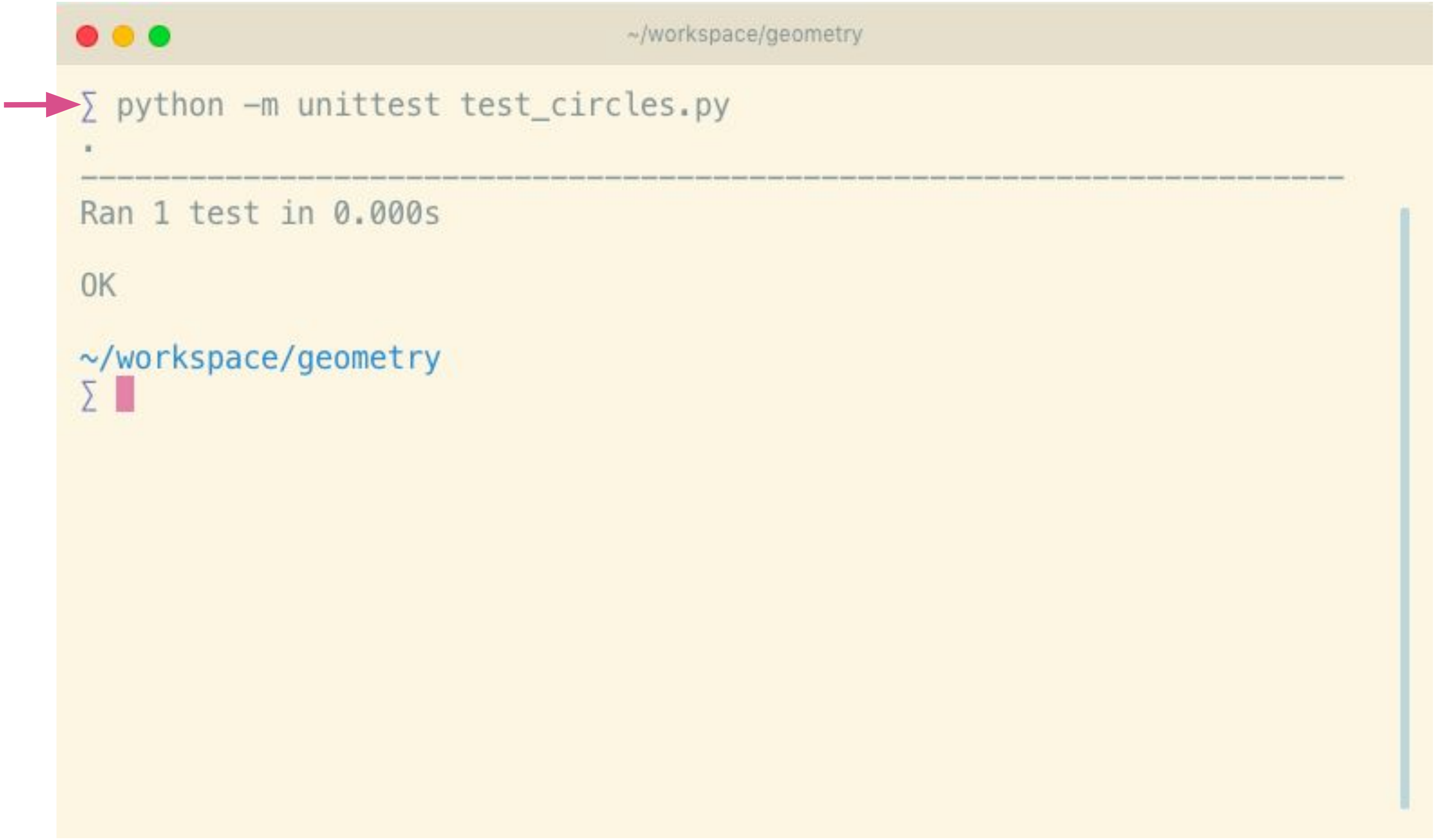

~/workspace/geometry

```
∑ python -m unittest test_circles.py
.
----------------------------------------------------------------------
Ran 1 test in 0.000s

OK

~/workspace/geometry
∑ 
```



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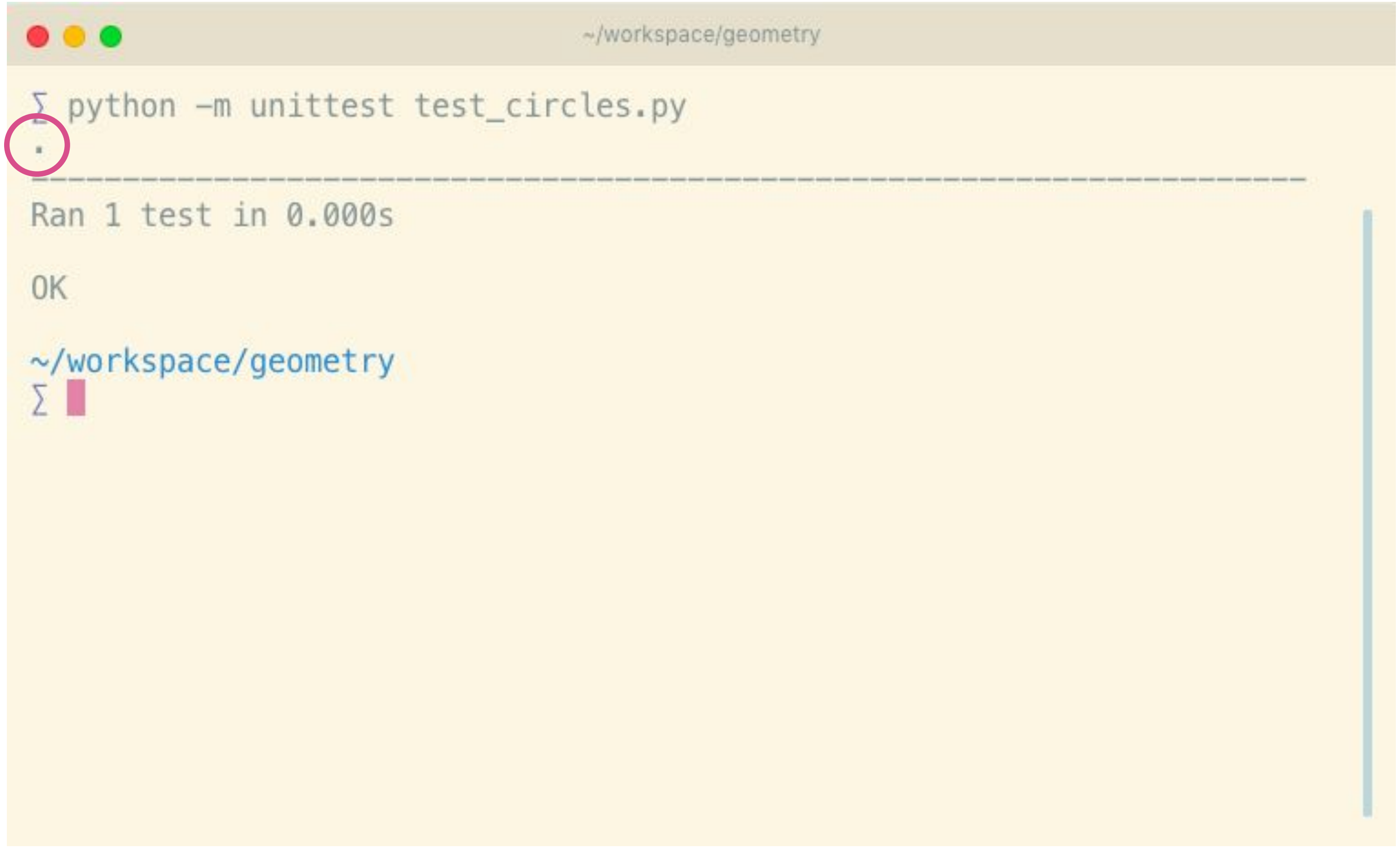

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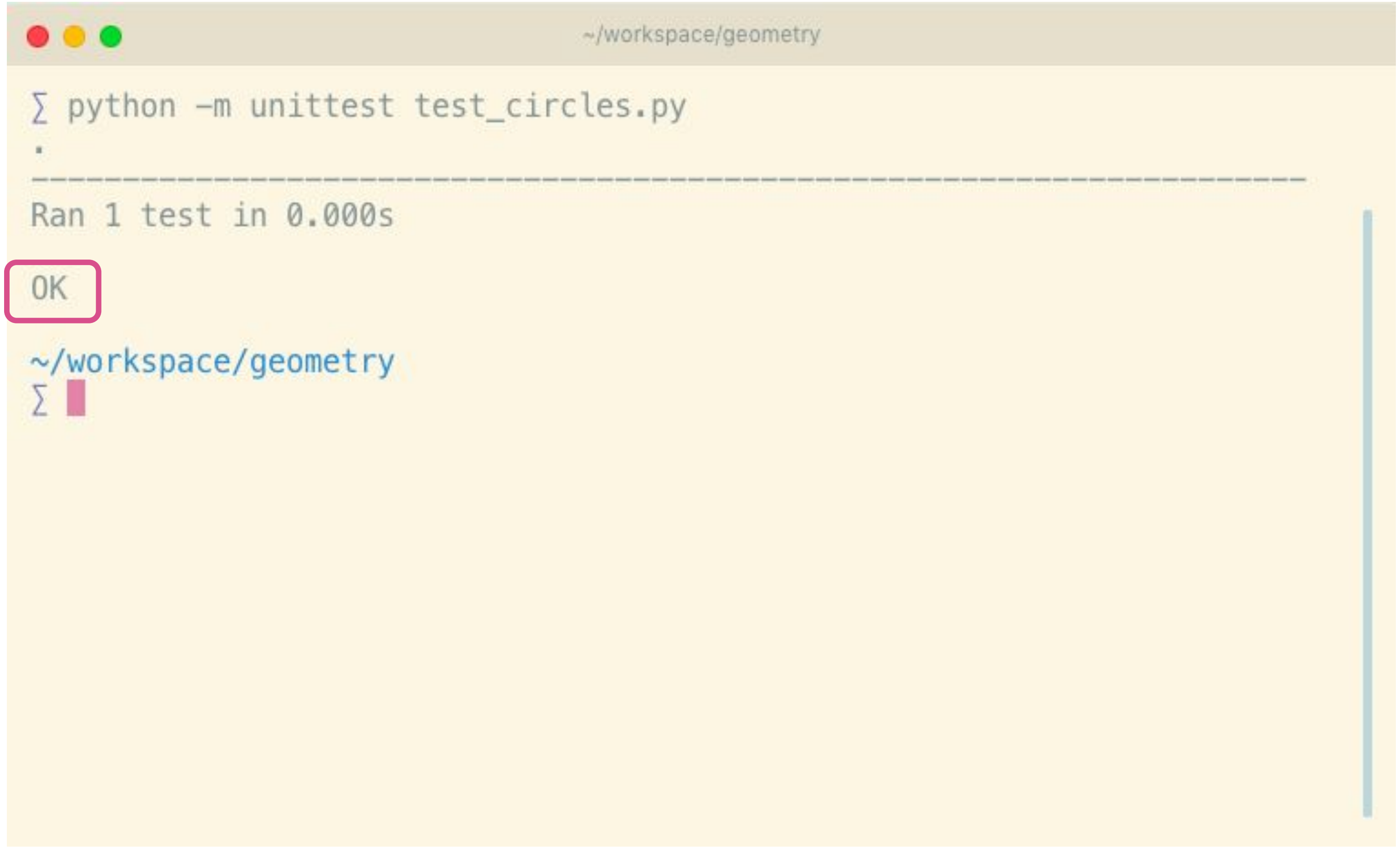

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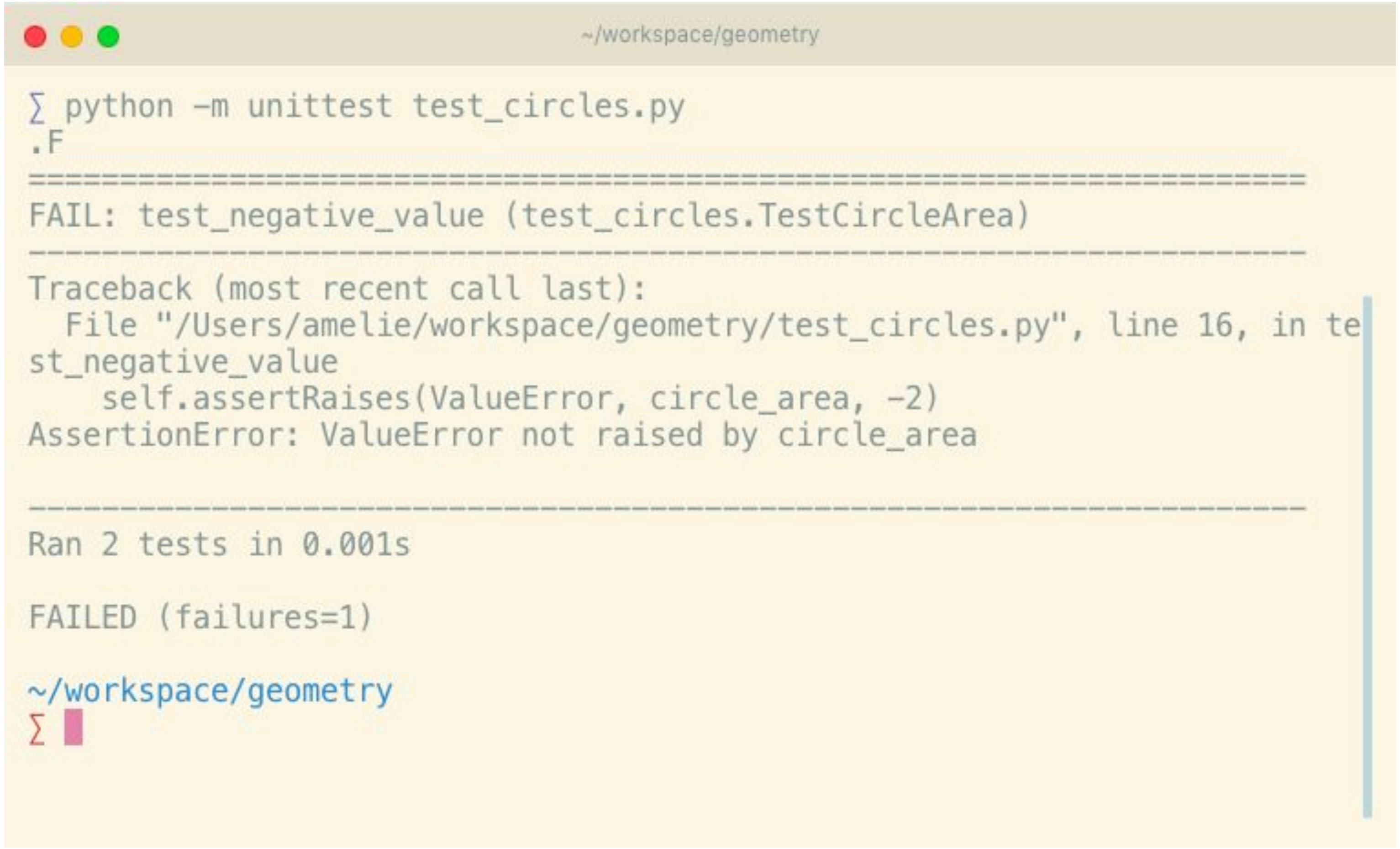
```python
    def test_negative_value(self):
      self.assertRaises(ValueError, circle_area, -2)
```



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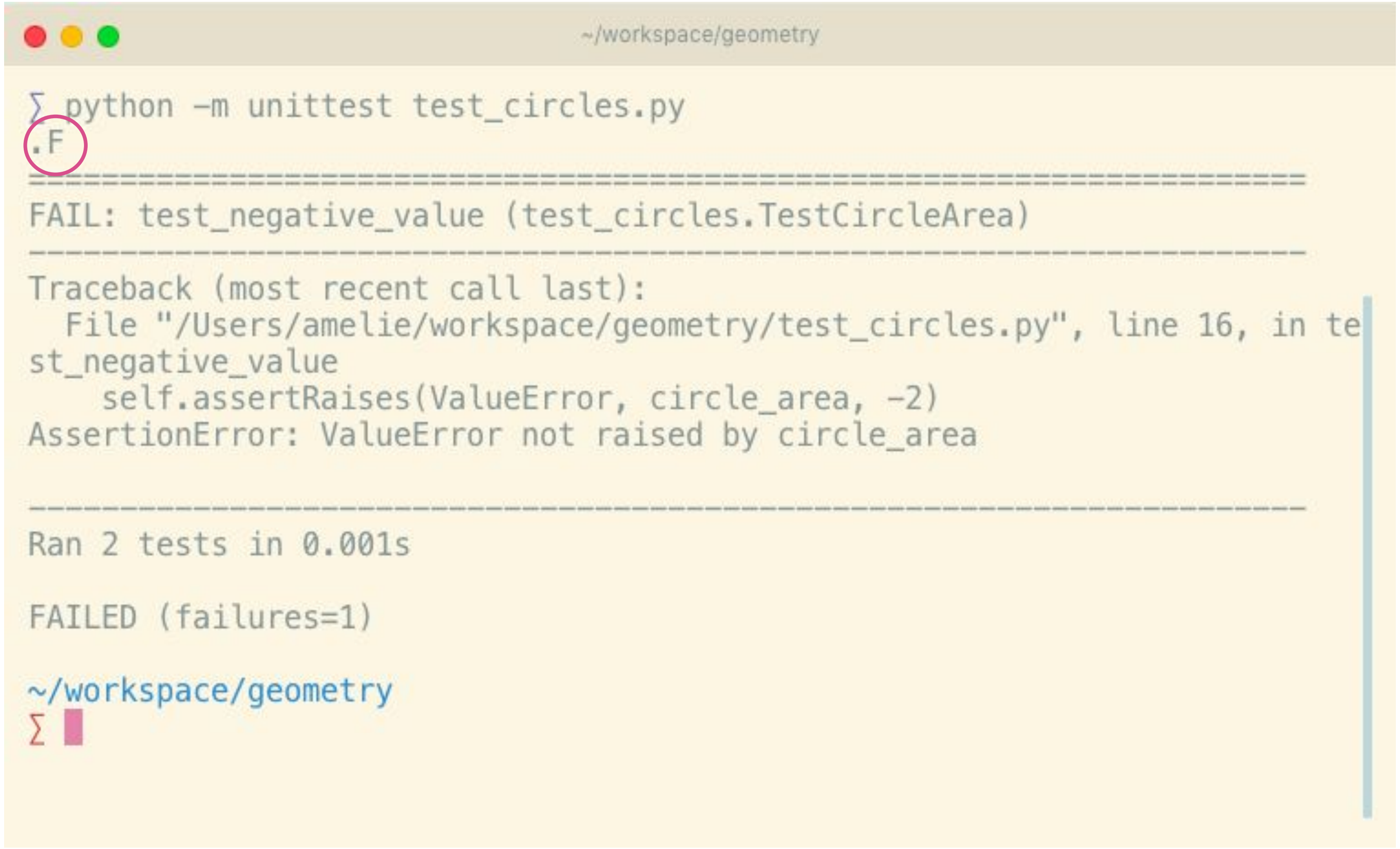
```
∑ python -m unittest test_circles.py
.F
======================================================================
FAIL: test_negative_value (test_circles.TestCircleArea)
----------------------------------------------------------------------
Traceback (most recent call last):
  File "/Users/amelie/workspace/geometry/test_circles.py", line 16, in te
st_negative_value
    self.assertRaises(ValueError, circle_area, -2)
AssertionError: ValueError not raised by circle_area


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

FAILED (failures=1)

~/workspace/geometry
∑
```



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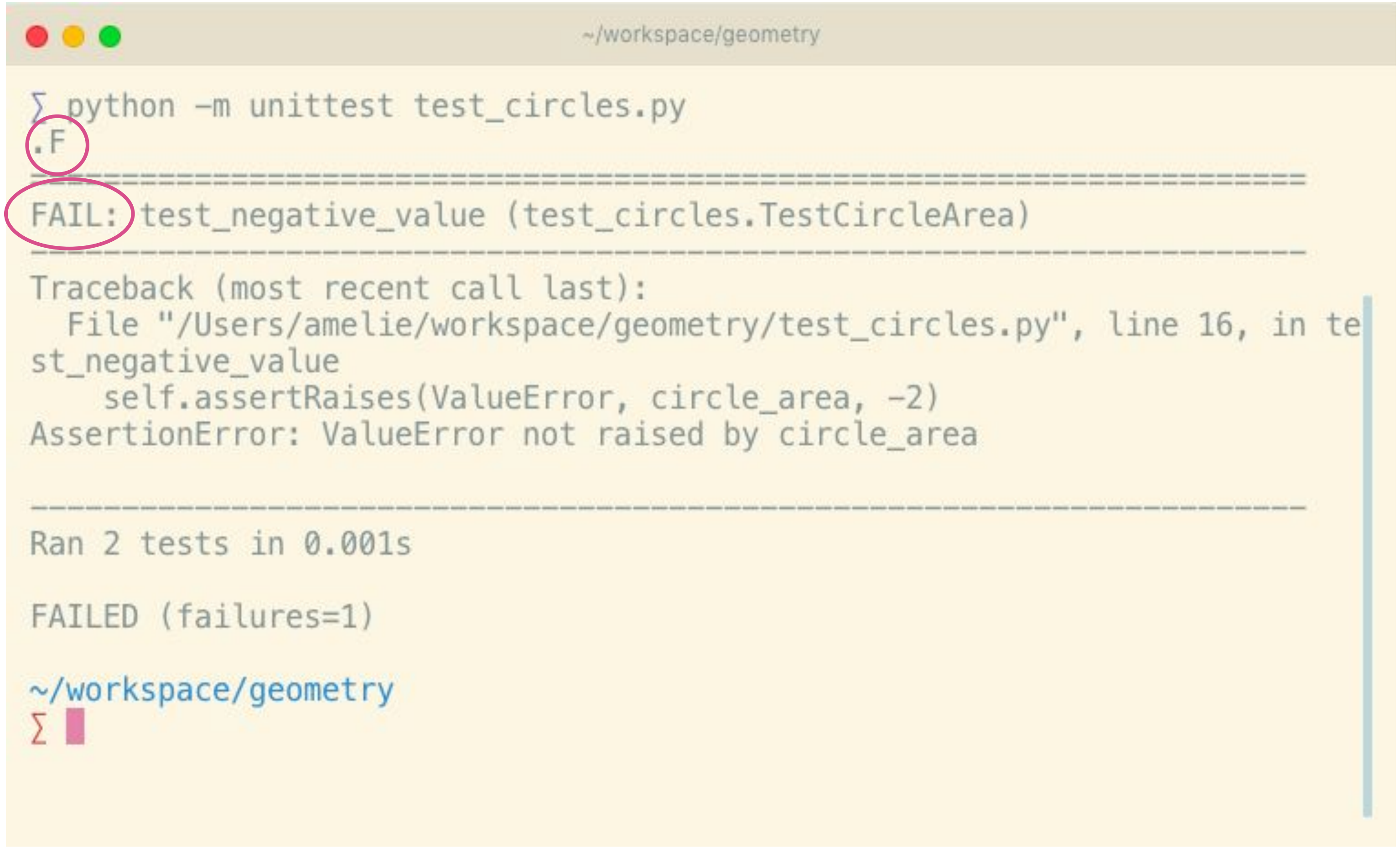

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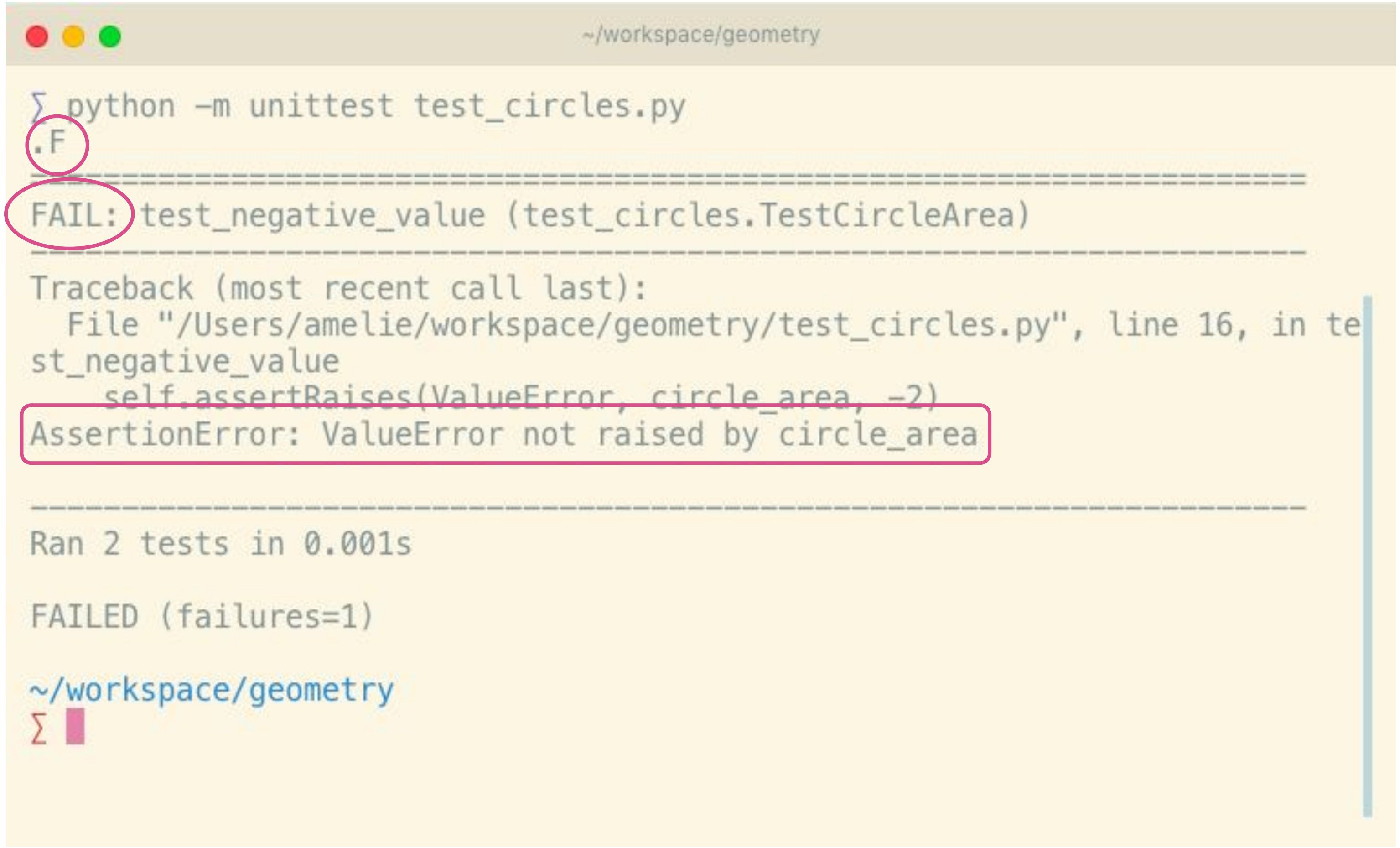

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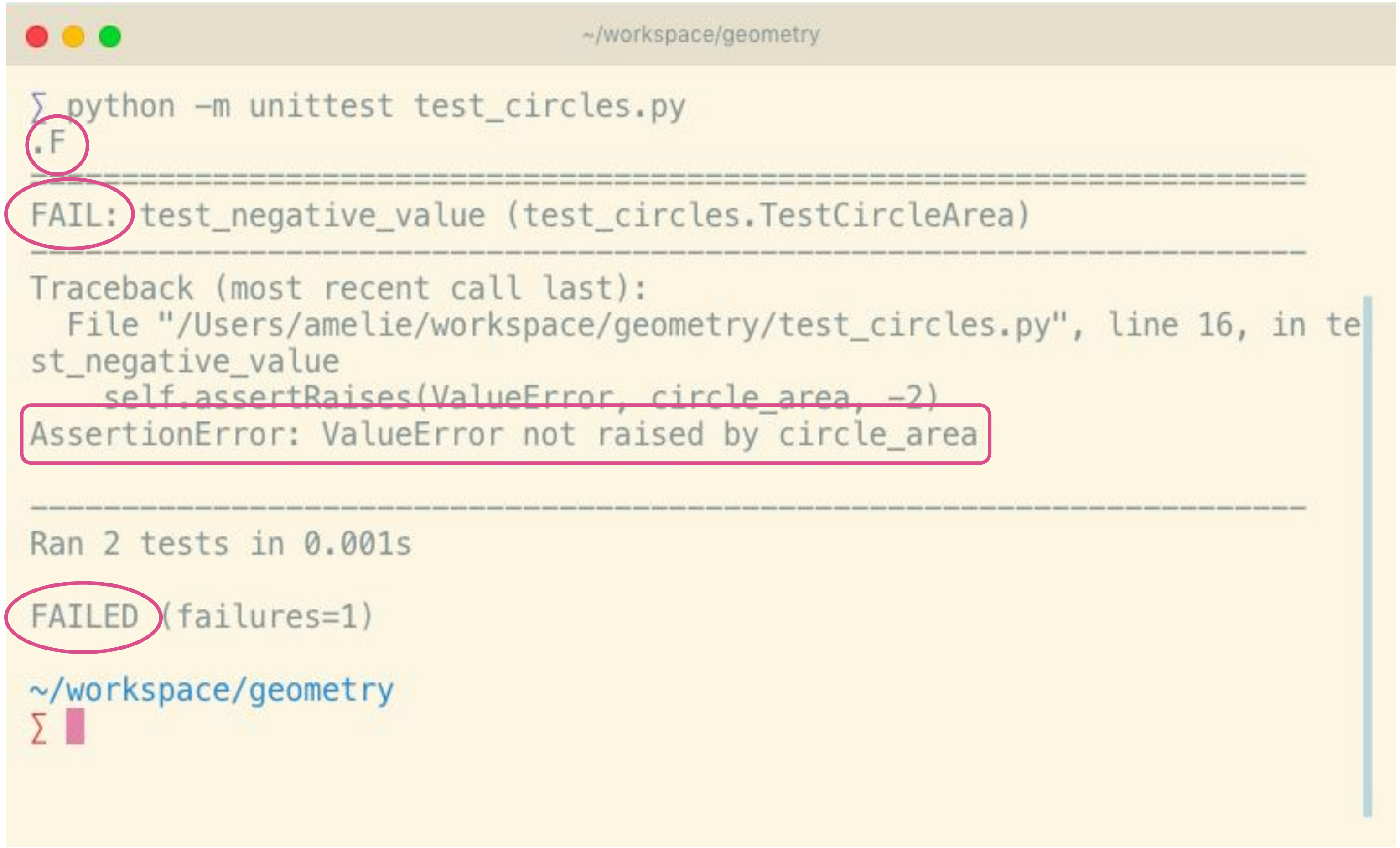

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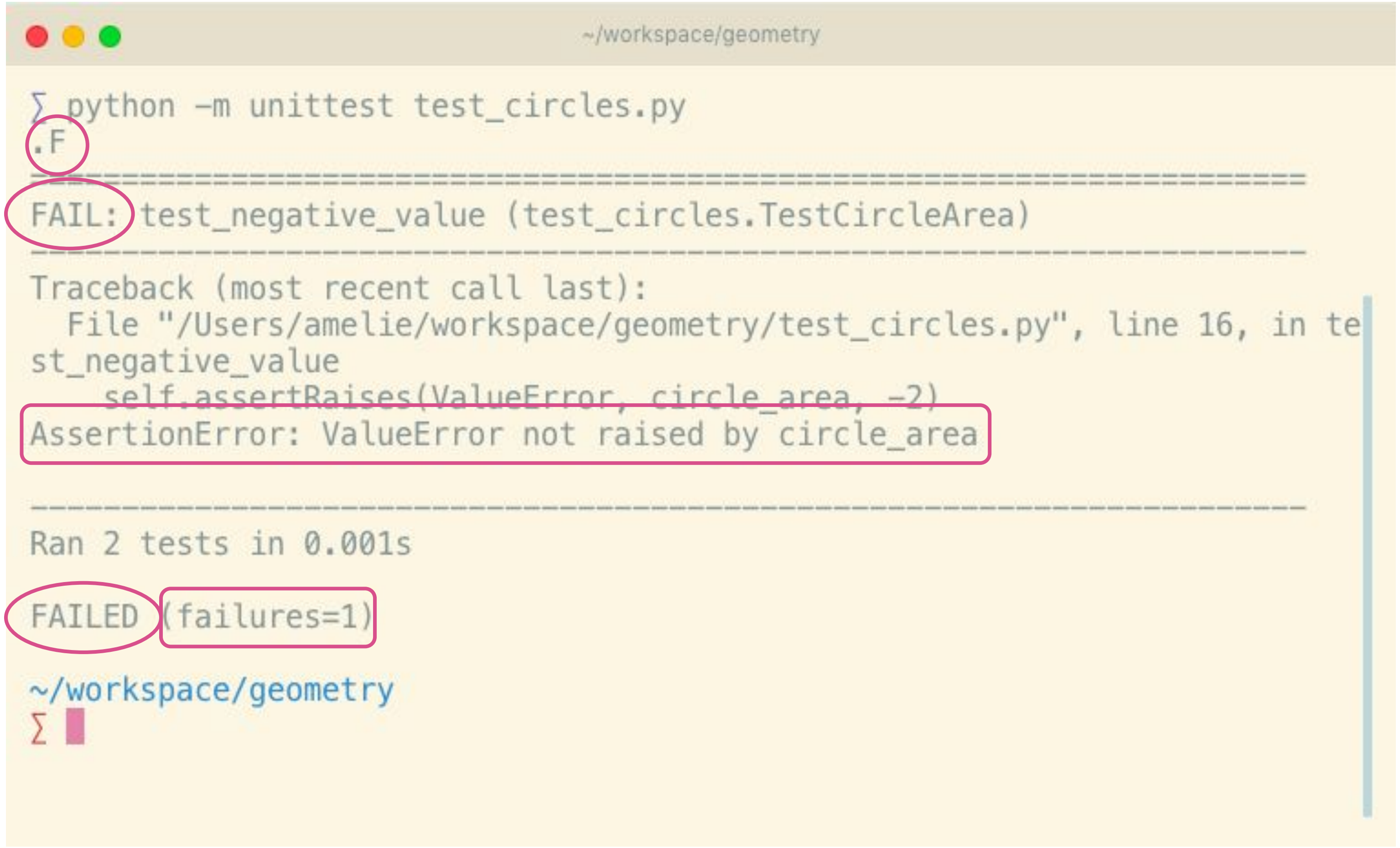

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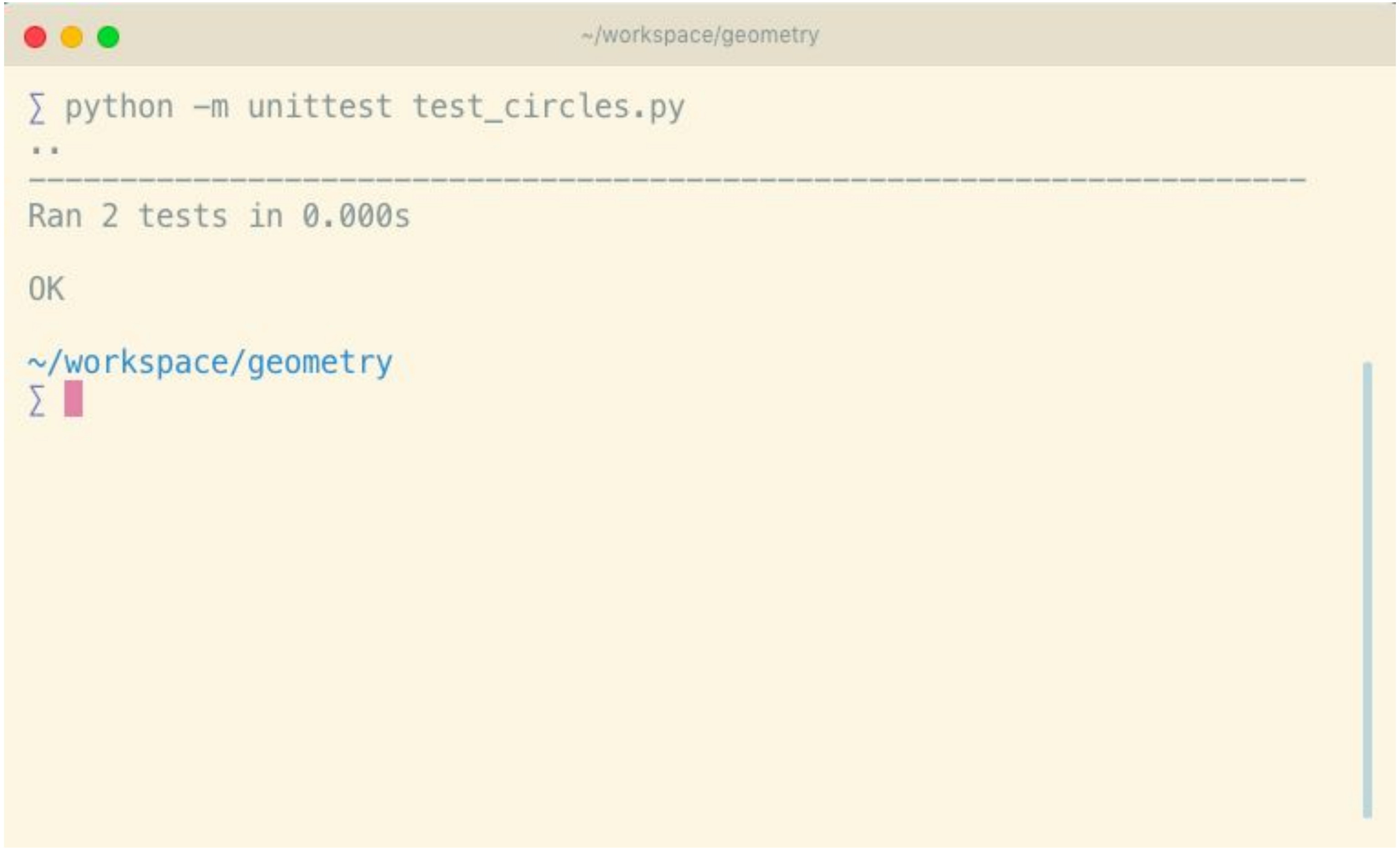
FAILED (failures=1)

~/workspace/geometry
∑
```

```python
from math import pi

def circle_area(r):
  if r < 0:
    raise ValueError("The radius cannot be negative.")
  return pi*(r**2)
```



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OK

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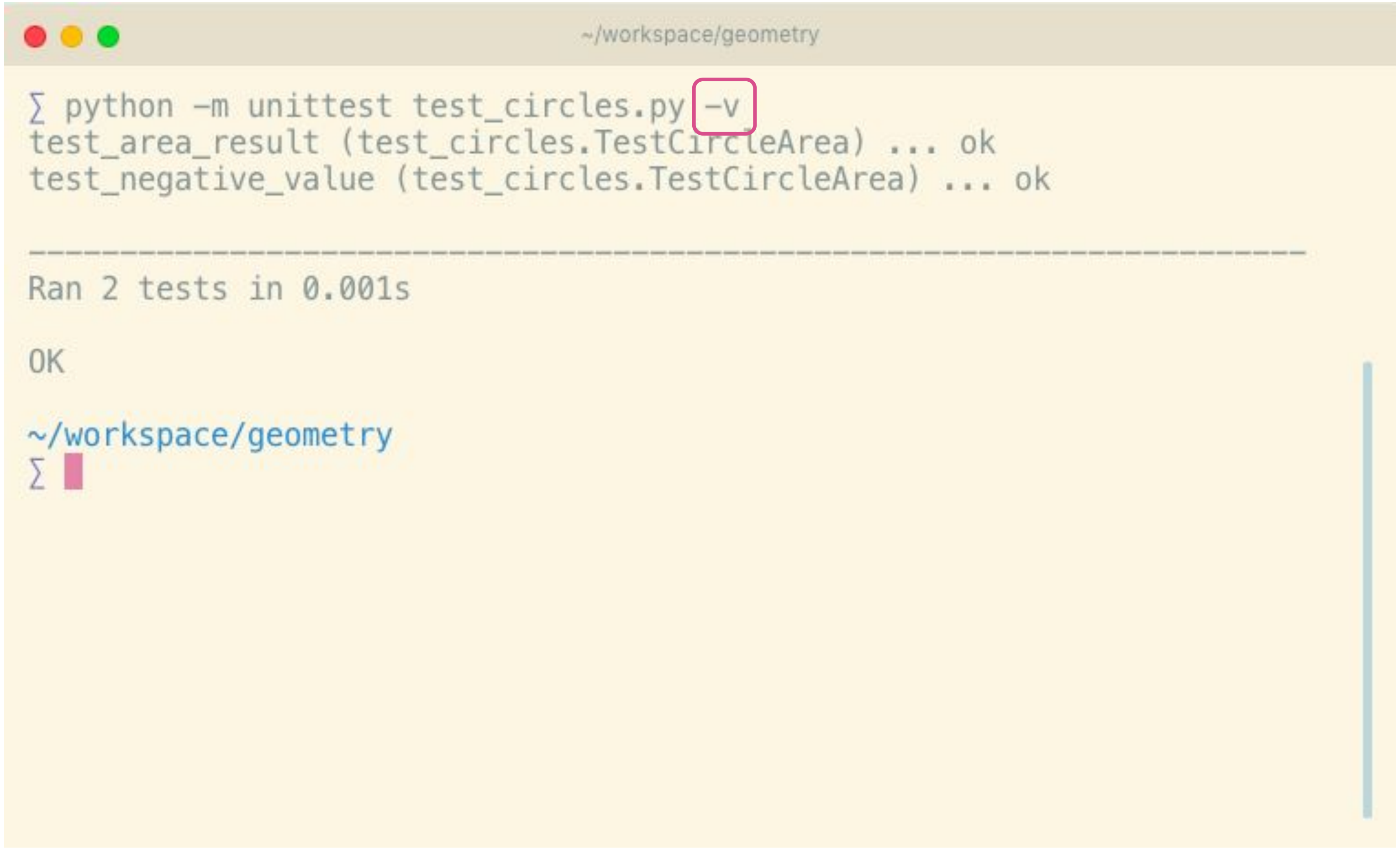
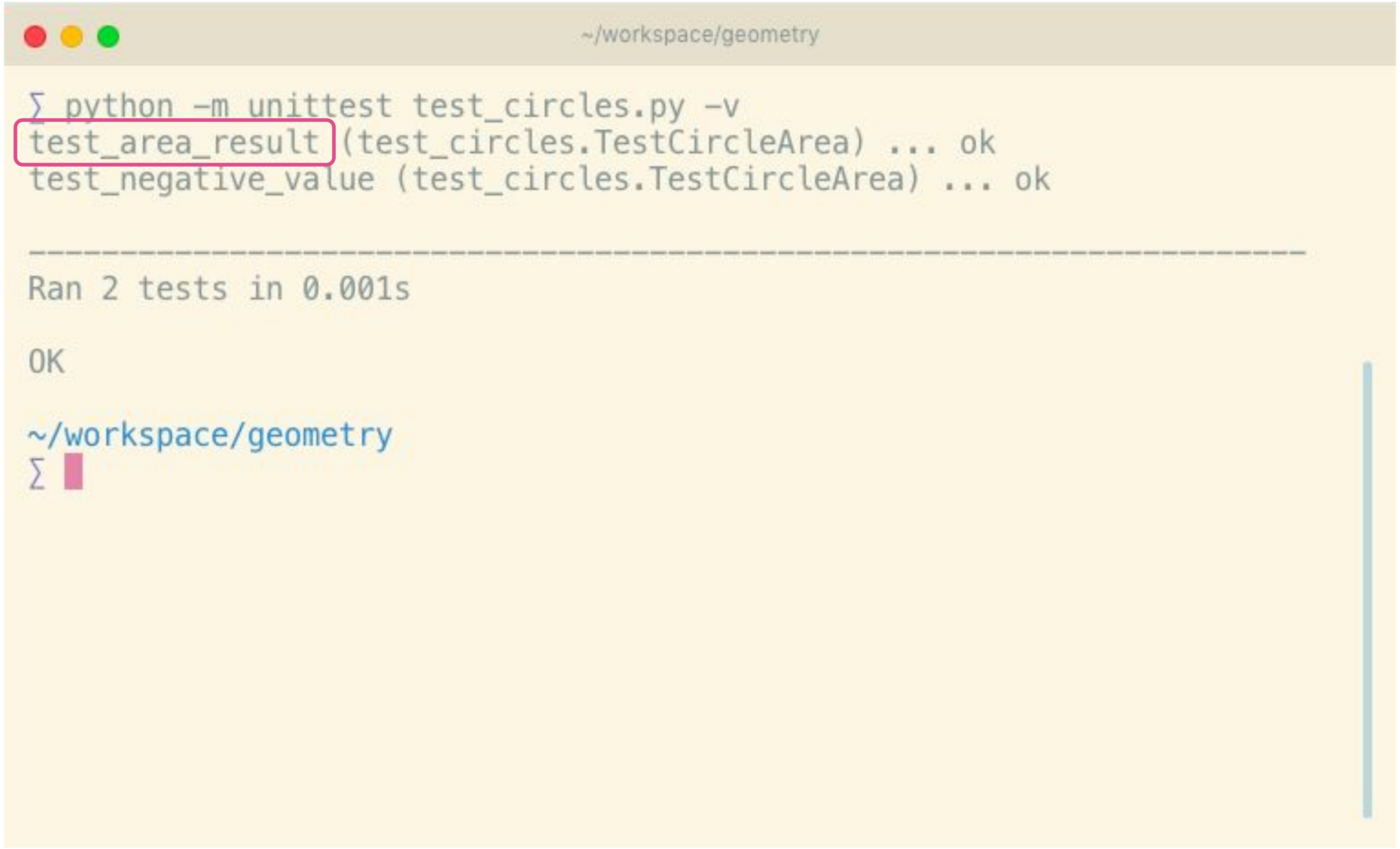


```
∑ python -m unittest test_circles.py -v
test_area_result (test_circles.TestCircleArea) ... ok
test_negative_value (test_circles.TestCircleArea) ... ok

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

OK

~/workspace/geometry
∑ 
```


~/workspace/geometry

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OK

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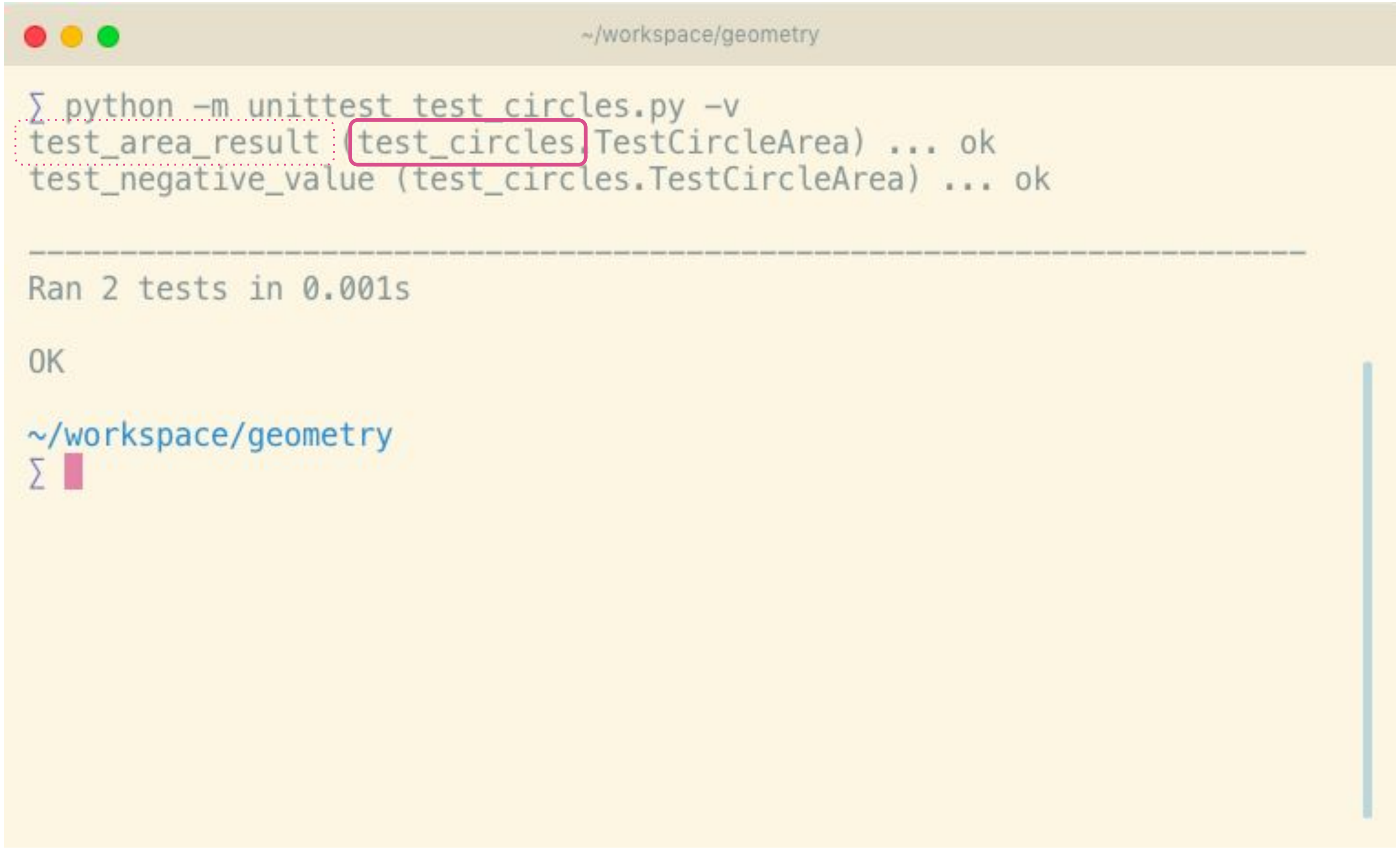

~/workspace/geometry

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OK

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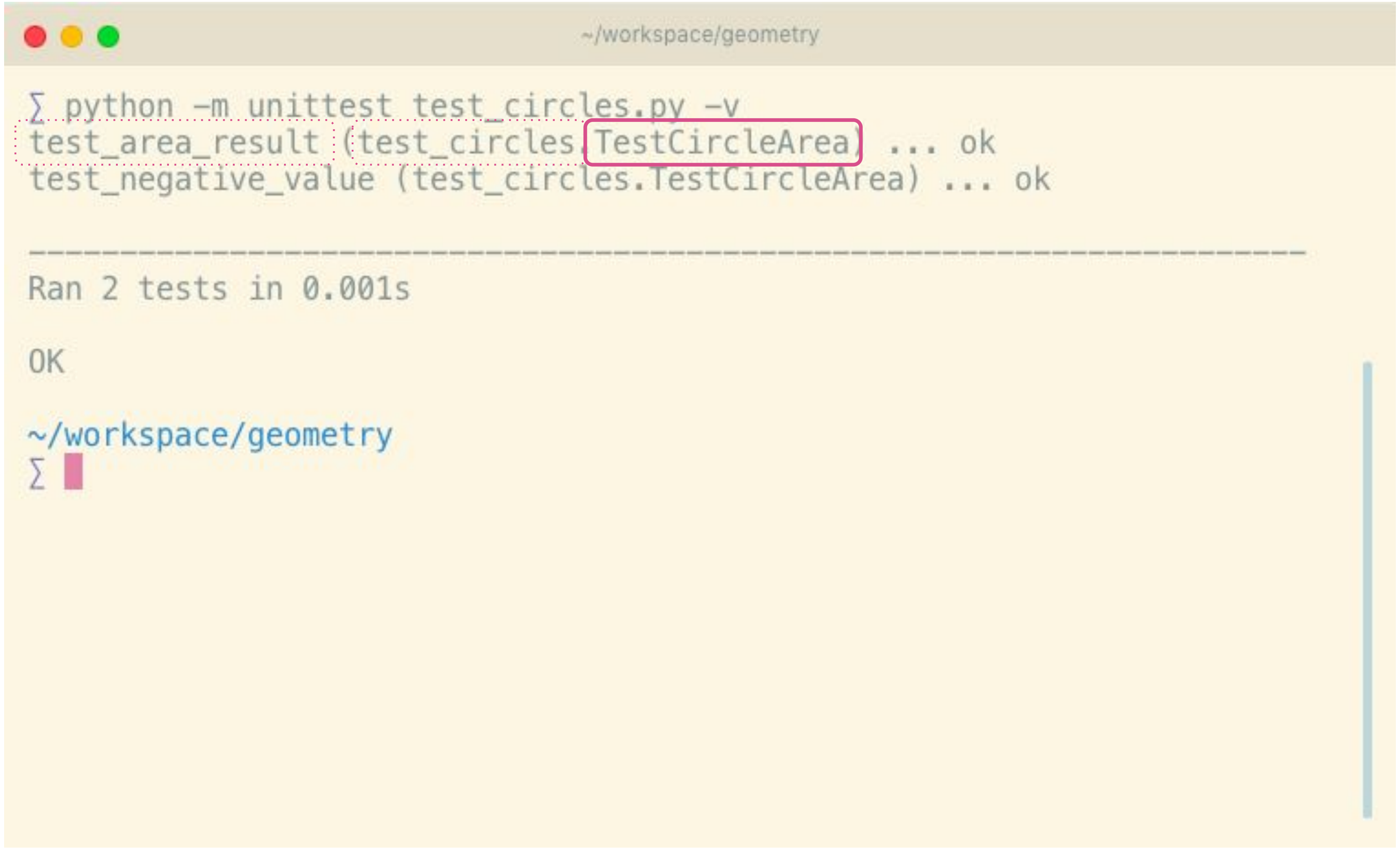

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OK

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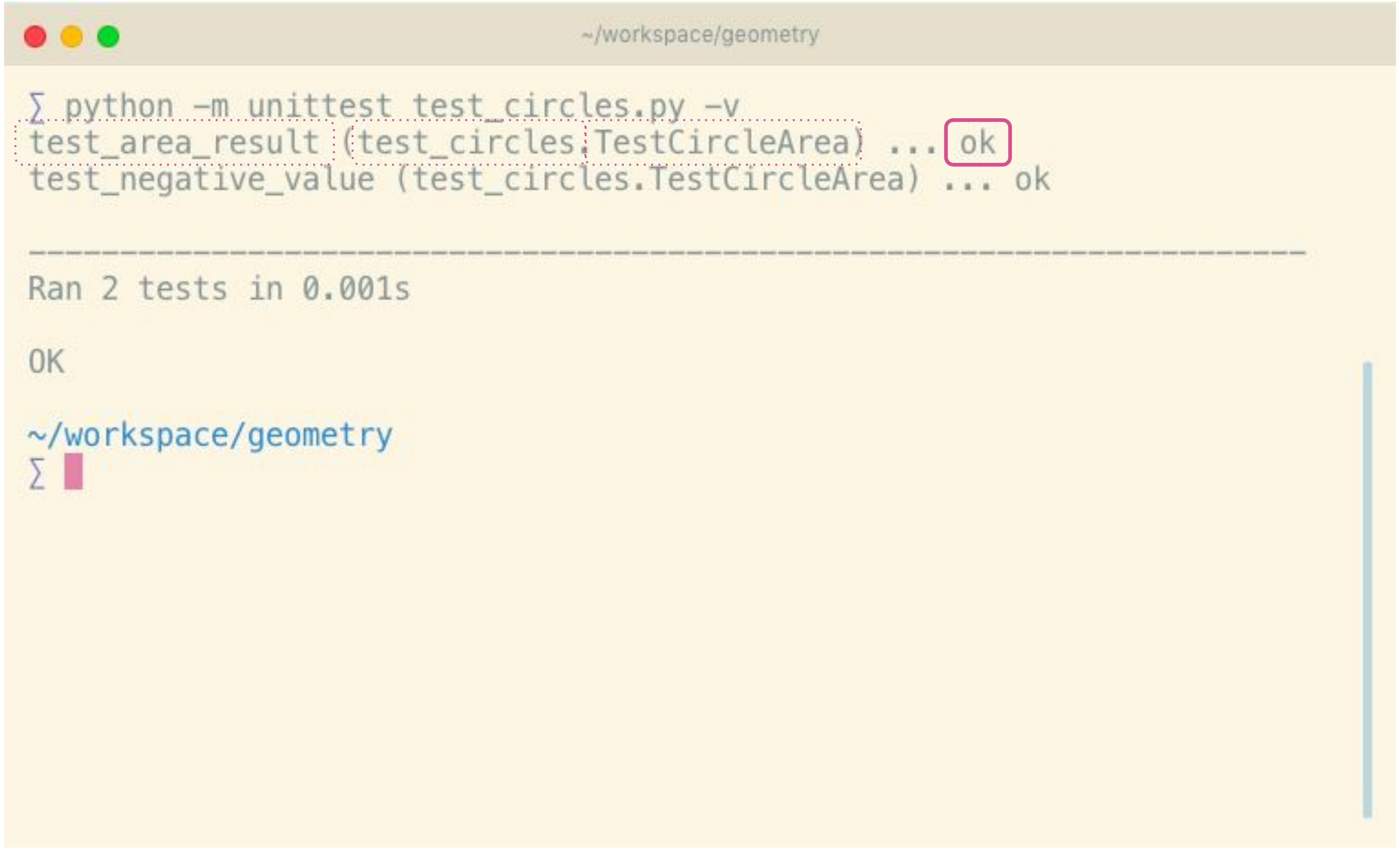


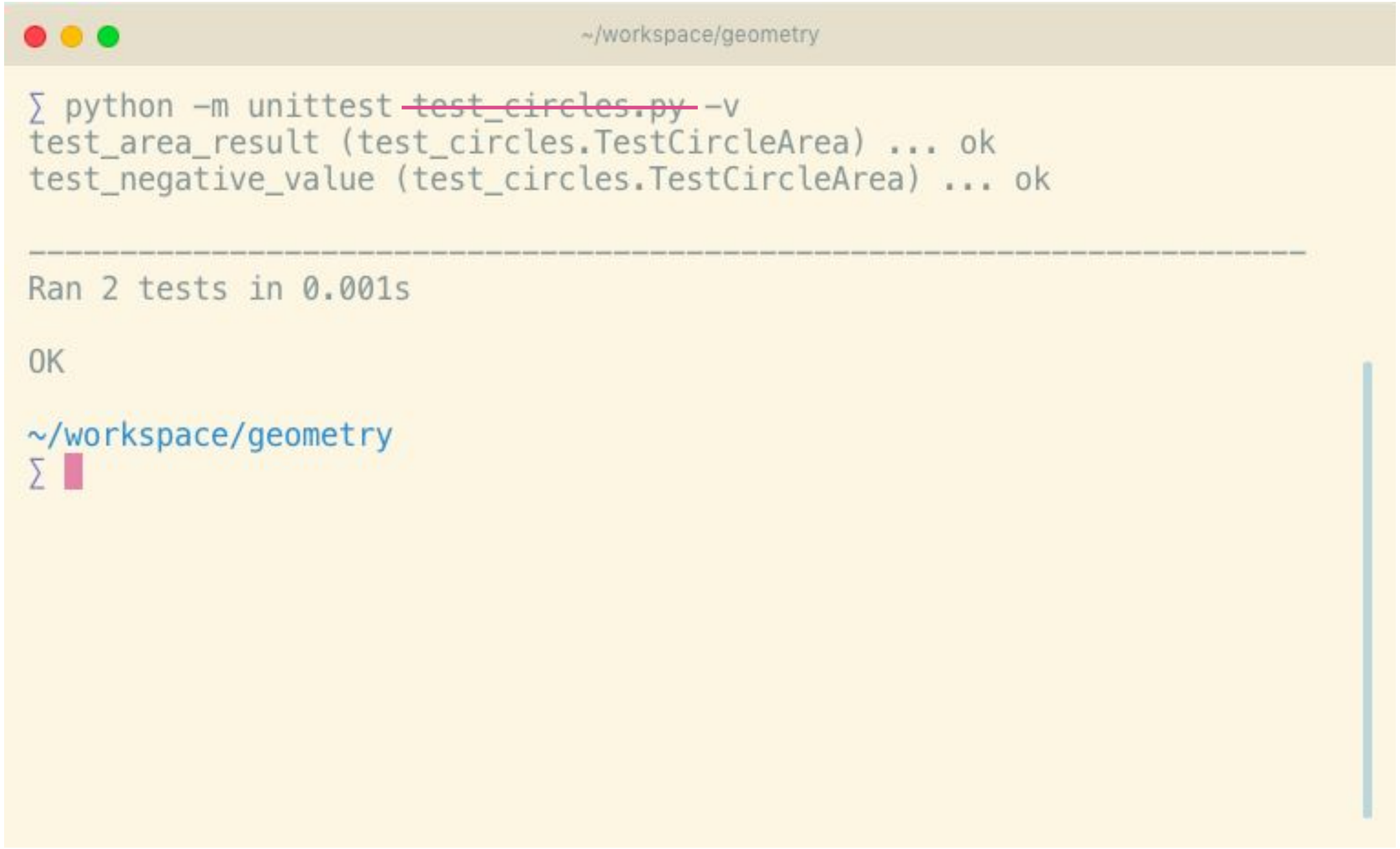
~/workspace/geometry

```
∑ python -m unittest test_circles.py -v
test_area_result (test_circles.TestCircleArea) ... ok
test_negative_value (test_circles.TestCircleArea) ... ok

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

OK

~/workspace/geometry
∑
```

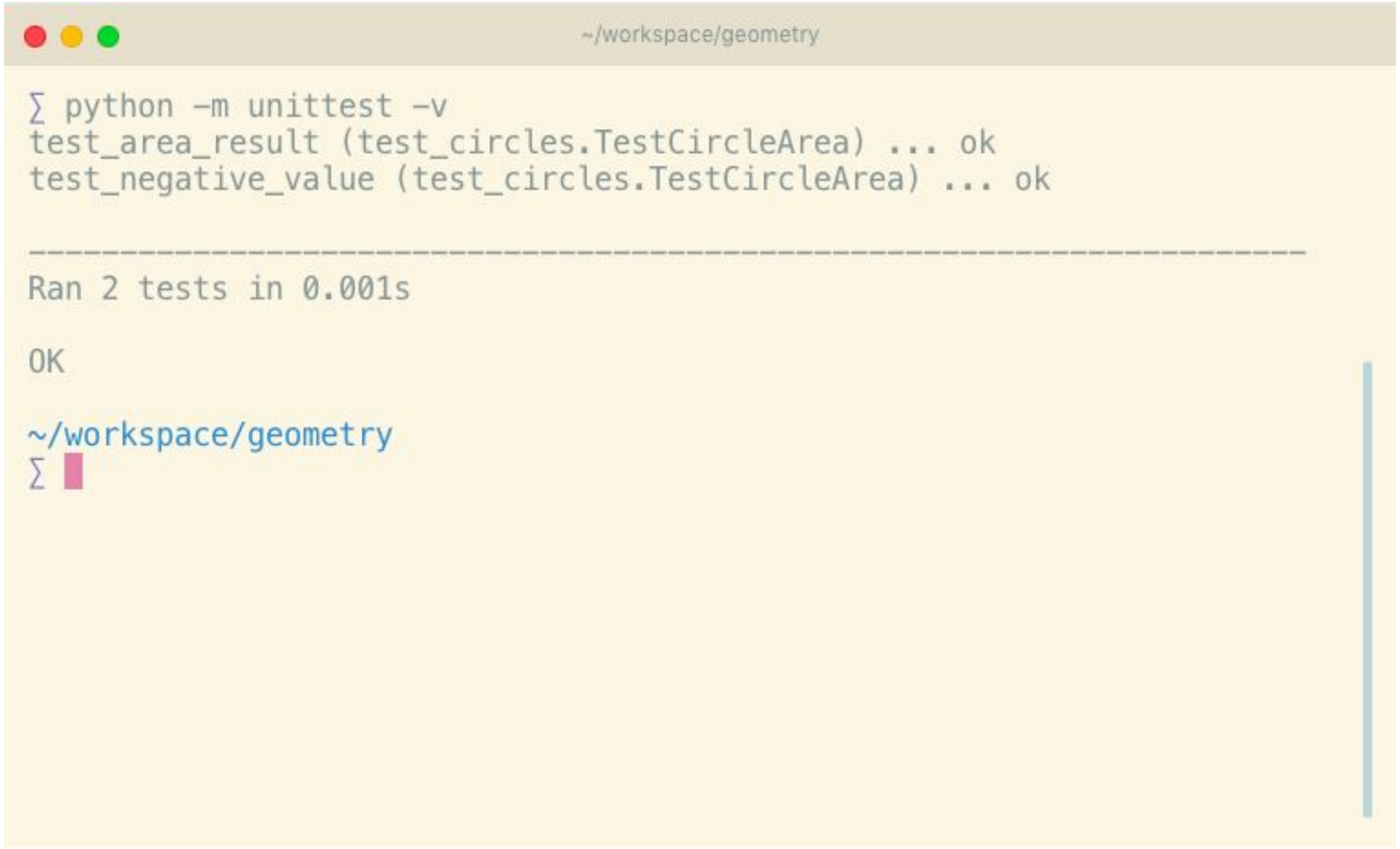

~/workspace/geometry

```
∑ python -m unittest ~~test_circles.py~~ -v
test_area_result (test_circles.TestCircleArea) ... ok
test_negative_value (test_circles.TestCircleArea) ... ok

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

OK

~/workspace/geometry
∑ 
```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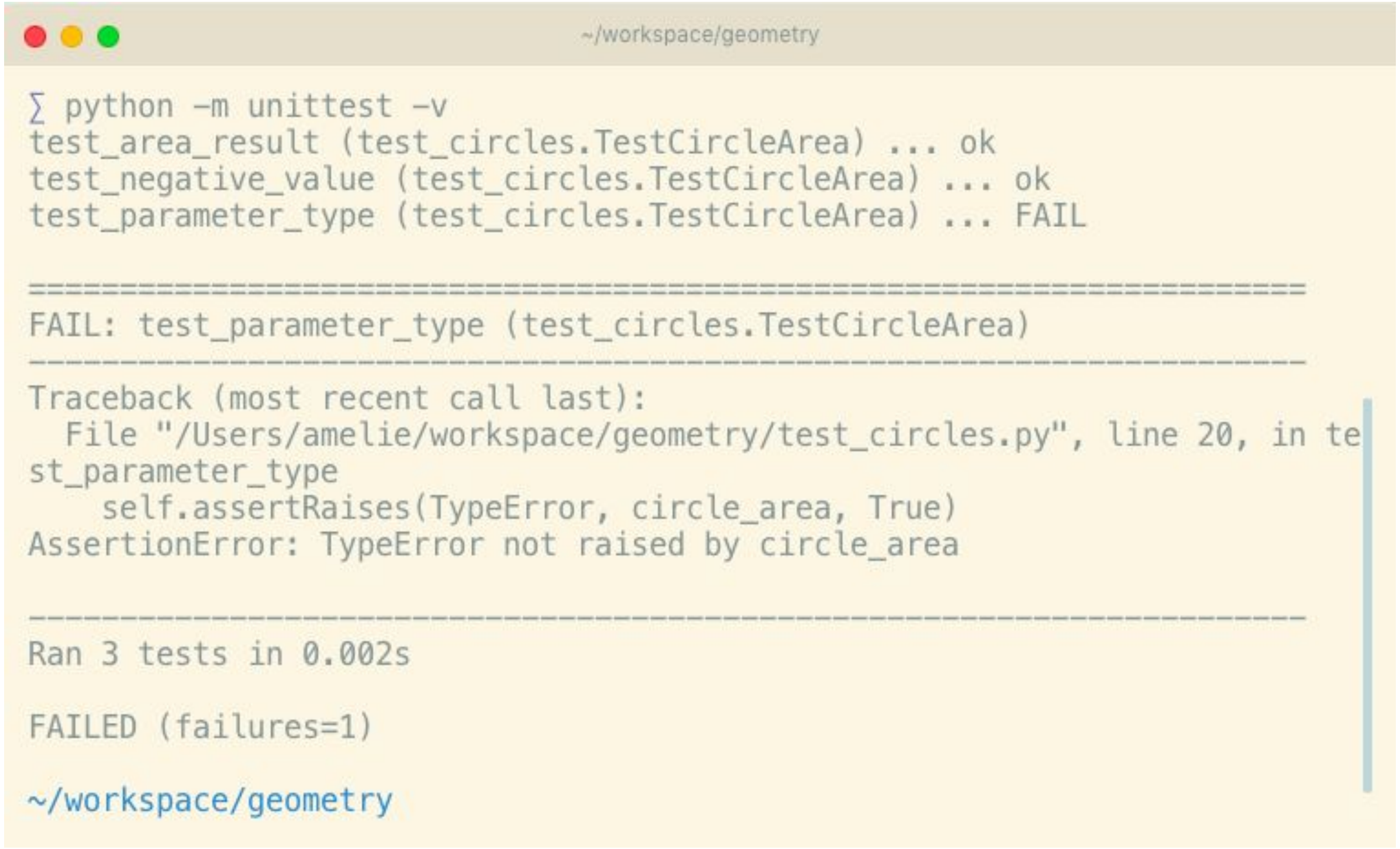
test_area_result (test_circles.TestCircleArea) ... ok
test_negative_value (test_circles.TestCircleArea) ... ok

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

OK

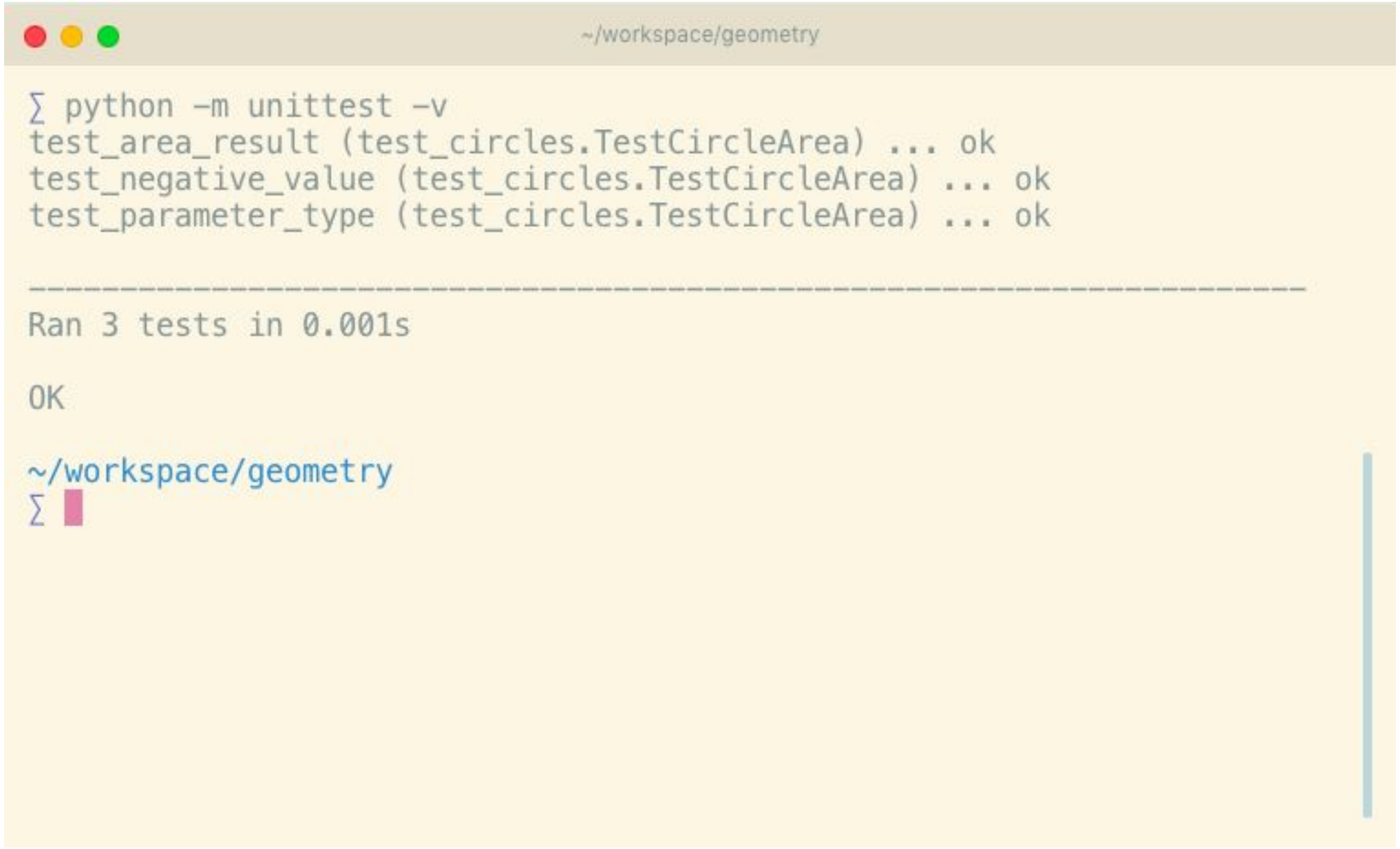
~/workspace/geometry
∑ 
```

```python
    def test_parameter_type(self):
      self.assertRaises(TypeError, circle_area, 3+5j)
      self.assertRaises(TypeError, circle_area, True)
      self.assertRaises(TypeError, circle_area, "radius")
```



```
∑ python -m unittest -v
test_area_result (test_circles.TestCircleArea) ... ok
test_negative_value (test_circles.TestCircleArea) ... ok
test_parameter_type (test_circles.TestCircleArea) ... FAIL

======================================================================
FAIL: test_parameter_type (test_circles.TestCircleArea)
----------------------------------------------------------------------
Traceback (most recent call last):
  File "/Users/amelie/workspace/geometry/test_circles.py", line 20, in te
st_parameter_type
    self.assertRaises(TypeError, circle_area, True)
AssertionError: TypeError not raised by circle_area

----------------------------------------------------------------------
Ran 3 tests in 0.002s

FAILED (failures=1)

~/workspace/geometry
```

```python
from math import pi

def circle_area(r):
  if type(r) not in [int, float]:
    raise TypeError("The radius must be a real number.")
  if r < 0:
    raise ValueError("The radius cannot be negative.")
  return pi*(r**2)
```



~/workspace/geometry

```
∑ python -m unittest -v
test_area_result (test_circles.TestCircleArea) ... ok
test_negative_value (test_circles.TestCircleArea) ... ok
test_parameter_type (test_circles.TestCircleArea) ... ok

----------------------------------------------------------------------
Ran 3 tests in 0.001s

OK

~/workspace/geometry
∑ 
```

```python
import unittest
from math import pi
from circles import circle_area

class TestCircleArea(unittest.TestCase):
  def test_area_result(self):
    self.assertAlmostEqual(circle_area(1), pi)
    self.assertAlmostEqual(circle_area(0), 0)
    self.assertAlmostEqual(circle_area(2.1), pi * 2.1**2)

  def test_negative_value(self):
    self.assertRaises(ValueError, circle_area, -2)

  def test_parameter_type(self):
    self.assertRaises(TypeError, circle_area, 3+5j)
    self.assertRaises(TypeError, circle_area, True)
    self.assertRaises(TypeError, circle_area, "radius")
```

why should I test?

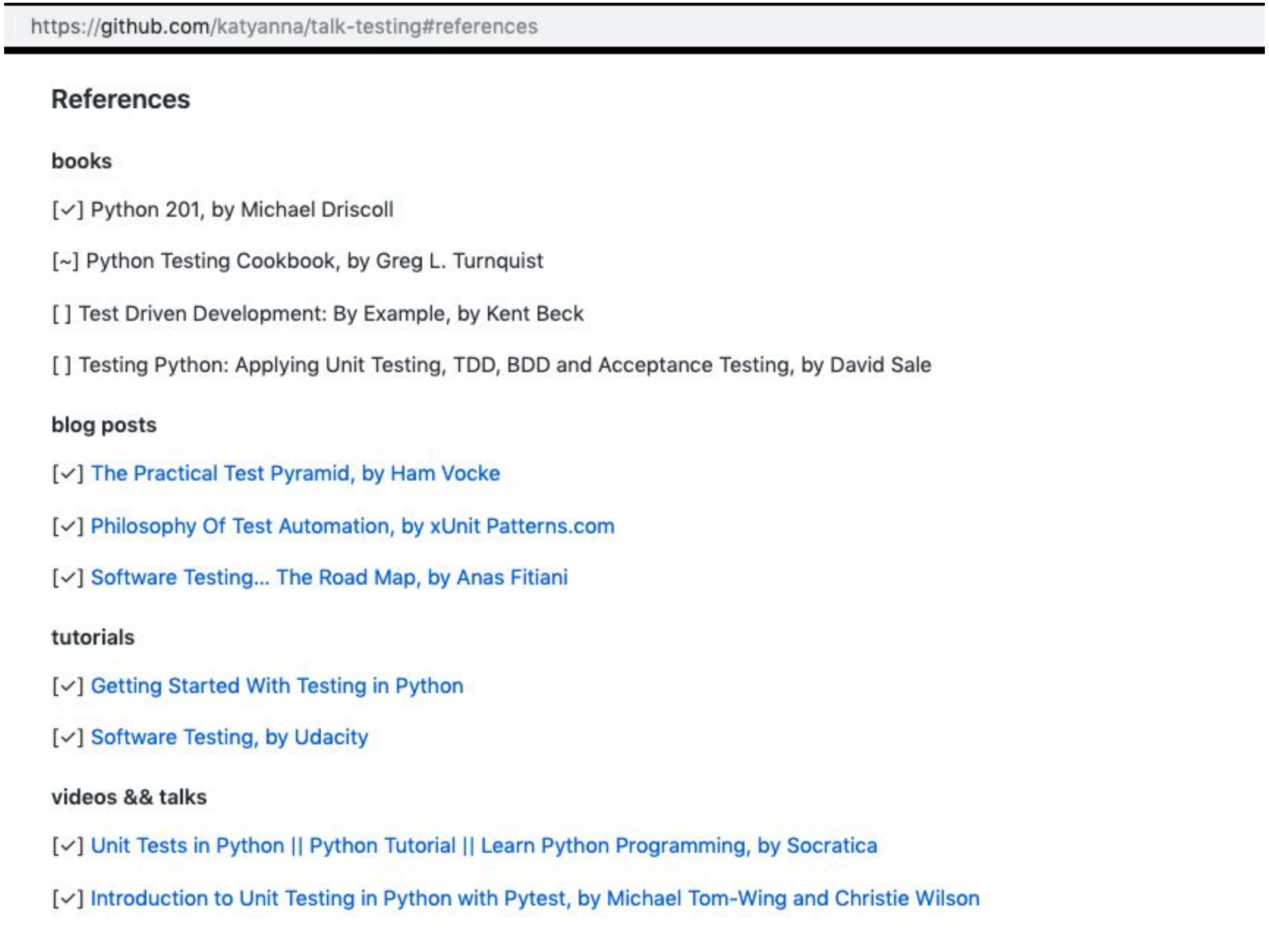
identify bugs early

confidence on the code

what's next?

Integration	PyTest	Selenium	nose
TDD	BDD	DDT	ATDD
Black-box	Hypothesis	Property-based	Mock
Maintainability	Test Pyramid	Continuous Integration	?

references



https://github.com/katyanna/talk-testing#references

References

books

[✓] Python 201, by Michael Driscoll

[~] Python Testing Cookbook, by Greg L. Turnquist

[ ] Test Driven Development: By Example, by Kent Beck

[ ] Testing Python: Applying Unit Testing, TDD, BDD and Acceptance Testing, by David Sale

blog posts

[✓] The Practical Test Pyramid, by Ham Vocke

[✓] Philosophy Of Test Automation, by xUnit Patterns.com

[✓] Software Testing... The Road Map, by Anas Fitiani

tutorials

[✓] Getting Started With Testing in Python

[✓] Software Testing, by Udacity

videos && talks

[✓] Unit Tests in Python || Python Tutorial || Learn Python Programming, by Socratica

[✓] Introduction to Unit Testing in Python with Pytest, by Michael Tom-Wing and Christie Wilson https://github.com/katyanna/talk-testing/README.md

Thank you! <3

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