

Unit Testing with the doctest module



Emily Bache
TECHNICAL AGILE COACH
@emilybache coding-is-like-cooking.info

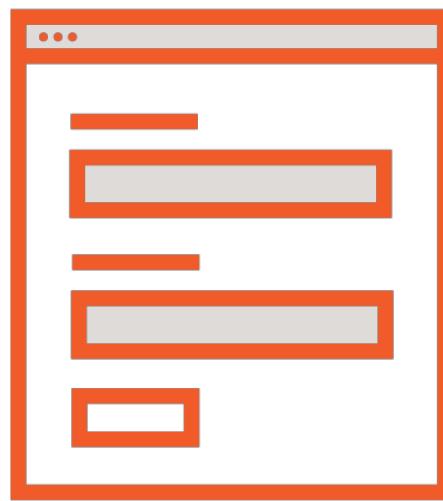
Summary

Why use doctest?

Handling output that changes

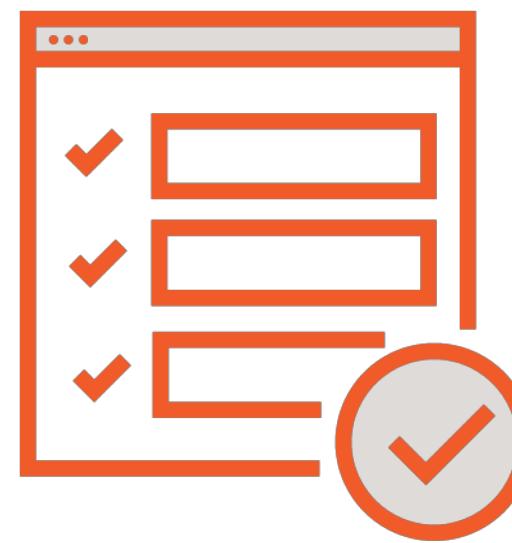
Using doctest for regression testing

Use Cases for doctest

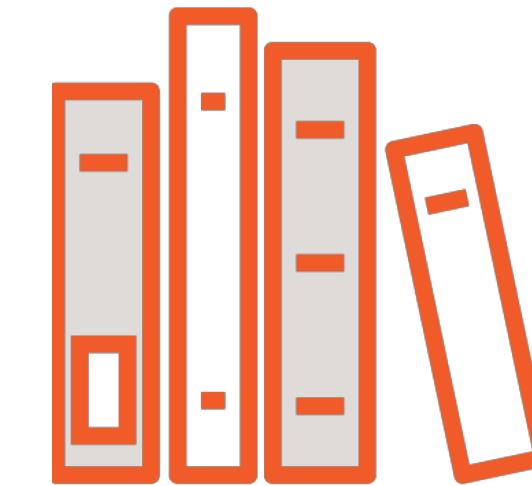


'docstring'
maintenance

Keep it synchronised
with the code



Regression Testing
Similar to unittest or
pytest



Tutorial
documentation

For when you publish
a python library

"""
This is the "example" module.

The example module supplies one function, factorial(). For example:

```
>>> factorial(5)
120
"""

def factorial(n):
    """Return the factorial of n, an exact integer >= 0.

>>> [factorial(n) for n in range(6)]
[1, 1, 2, 6, 24, 120]
>>> factorial(30)
265252859812191058636308480000000
>>> factorial(-1)
Traceback (most recent call last):
...
ValueError: n must be >= 0

Factorials of floats are OK, but the float must be an exact integer:
>>> factorial(30.1)
Traceback (most recent call last):
...
ValueError: n must be exact integer
>>> factorial(30.0)
265252859812191058636308480000000

It must also not be ridiculously large:
>>> factorial(1e100)
Traceback (most recent call last):
...
OverflowError: n too large
"""

import math
if not n >= 0:
    raise ValueError("n must be >= 0")
if math.floor(n) != n:
    raise ValueError("n must be exact integer")
if n+1 == n: # catch a value like 1e300
    raise OverflowError("n too large")
result = 1
factor = 2
while factor <= n:
    result *= factor
    factor += 1
return result
```

Docstrings are comments in the code that document how to use a module, class, or function

- doctest helps you keep them up to date

<https://docs.python.org/3/library/doctest.html>

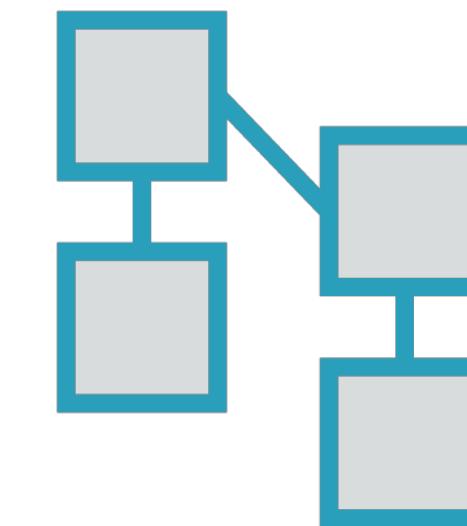
What is Unit Testing For?



**Understand what
to build**



**Document the
units**

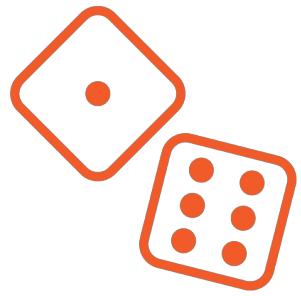


Design the units

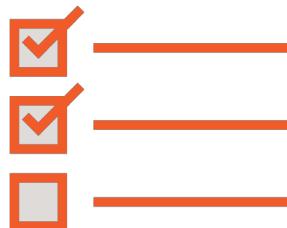


**Regression
protection**

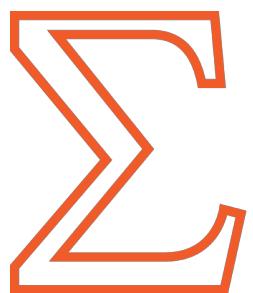
Yatzy Rules Summary



Roll 5 dice (and re-roll some twice)

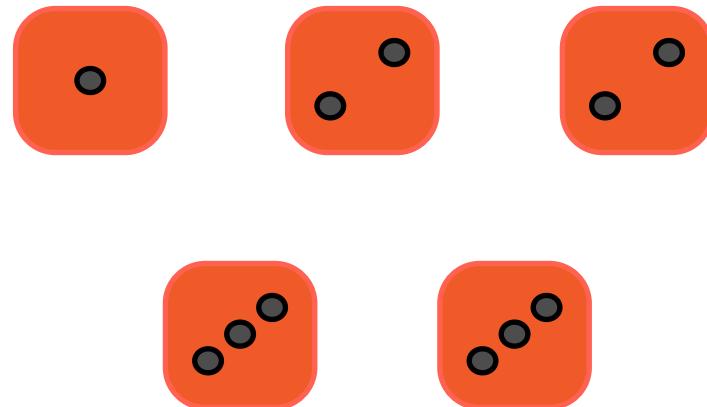


Choose an (unused) category to score the roll in



Your score is the sum of the scores in each category

Yatzy Scoring Examples



“Two Pairs”

$$2 + 2 + 3 + 3 = 10$$

“Threes”

$$3 + 3 = 6$$

“Small Straight”

Score is Zero

```
def small_straight(dice):  
    """Score the given roll in the  
    'small straight' yatzy category.
```

```
>>> small_straight([1,2,3,4,5])  
15  
>>> small_straight([1,2,3,4,4])  
0
```

It also accepts sets,
or unsorted lists

```
>>> small_straight({1,2,3,4,5})  
15  
>>> small_straight([5,4,3,2,1])  
15  
"""  
  
if sorted(dice) == [1,2,3,4,5]:  
    return sum(dice)  
else:
```

◀function under test

◀First examples

◀explanatory text

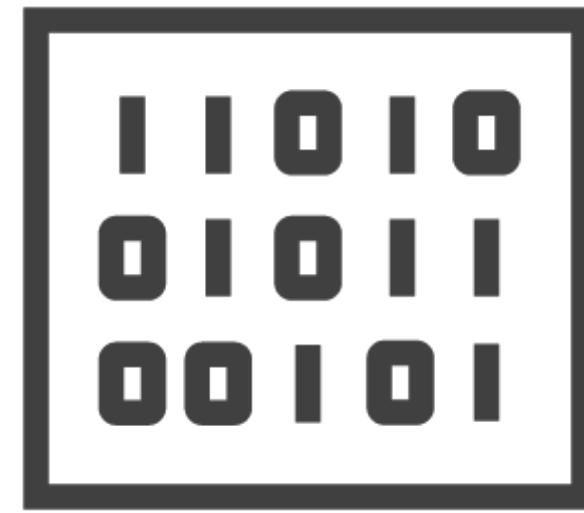
◀Further examples

◀ implementation of function

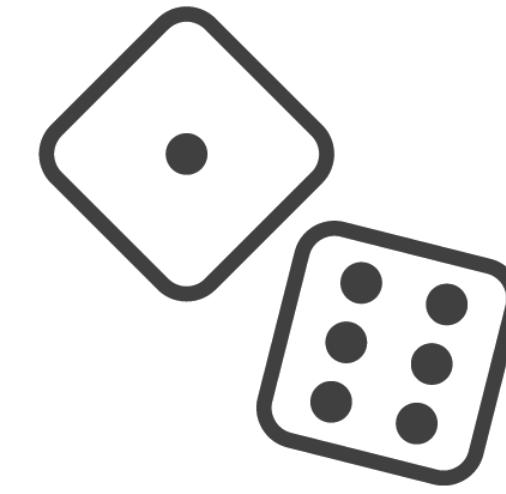
Handling Output that Changes



Dates and Times



Object IDs



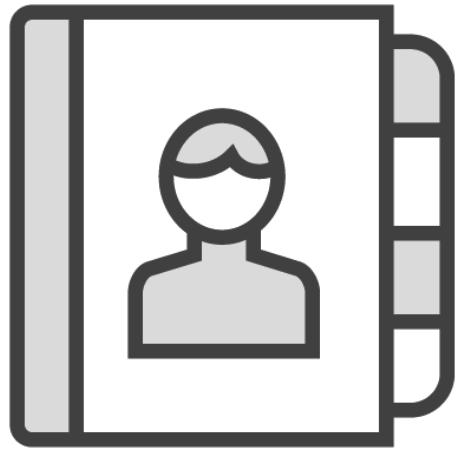
Random numbers

```
def scores_in_categories(dice, categories=(full_house, yatzy, small_straight,  
ones)):  
    """Score the dice in each category, with the highest scoring category  
first.  
  
    >>> scores_in_categories([1,1,2,2,2],  
... (ones, full_house)) #doctest: +ELLIPSIS  
[(8, <function full_house at 0x...>), (2, <function ones at 0x...>)]  
"""  
    scores = [(category(dice), category)  
              for category in categories  
              if category(dice) > 0]  
    return sorted(scores, reverse=True, key=itemgetter(0))
```

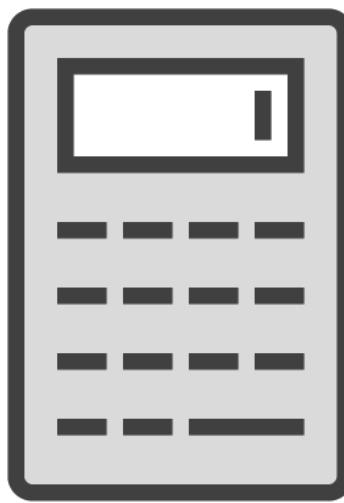
Match varying output

#doctest: +ELLIPSIS

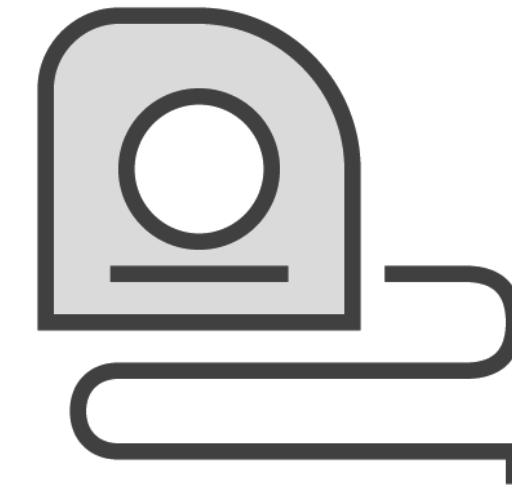
But Don't Worry (too much) About



Dictionaries

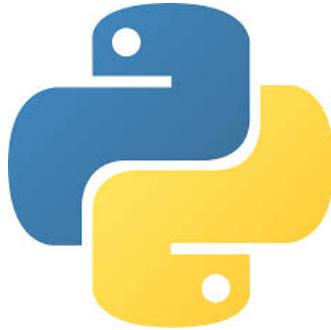


Floating point
numbers



Tracebacks

Test Runner Inconsistencies



doctest's own runner doesn't discover all your tests for you

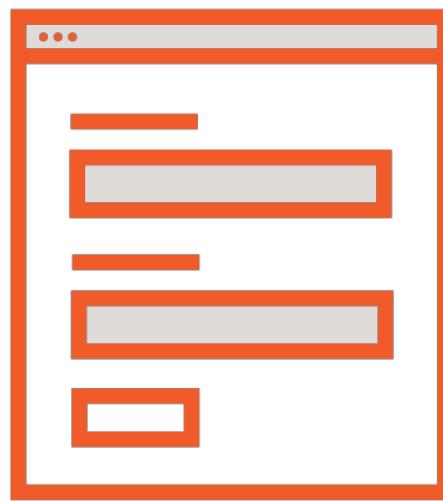


pytest has the +ELLIPSIS directive permanently on



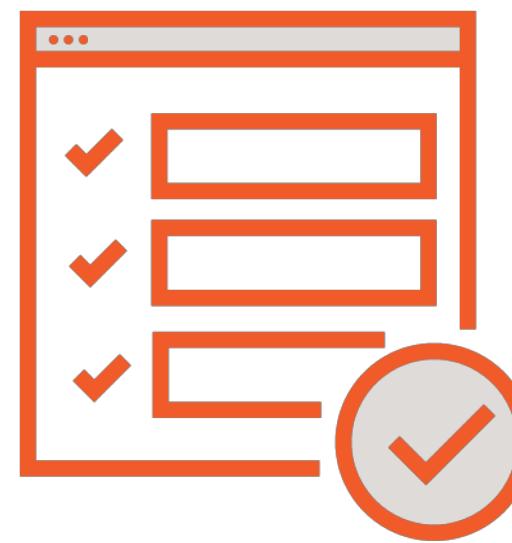
Pycharm's doctest runner doesn't accept global directives

Use Cases for doctest

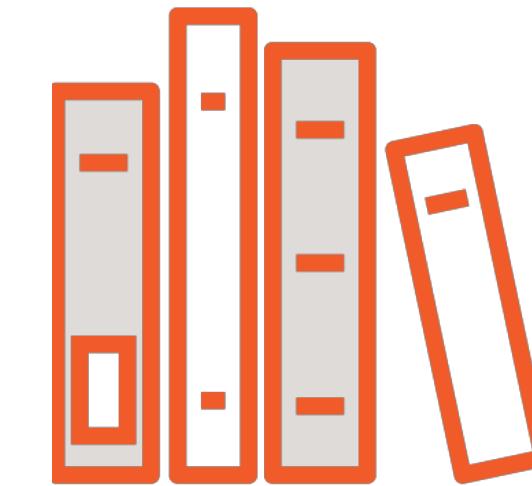


'docstring'
maintenance

Keep it synchronised
with the code



Regression Testing
Similar to unittest or
pytest



Tutorial
documentation

For when you publish
a python library

Summary

Why use doctest?

Handling output that changes

Using doctest for regression testing