Testing

Unit Testing

Studying impact of climate change on agriculture

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Have aerial photos of farms from 1980–83

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Want to compare with photos from 2007–present

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First step is to find regions where fields overlap

Luckily, these fields are in Saskatchewan...

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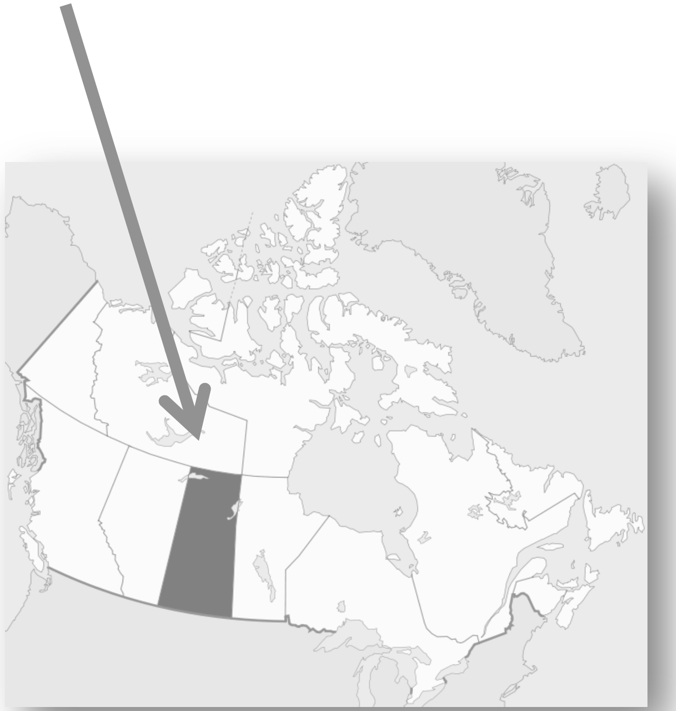

...where fields are rectangles

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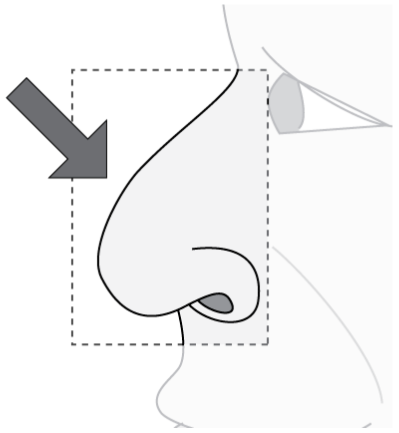
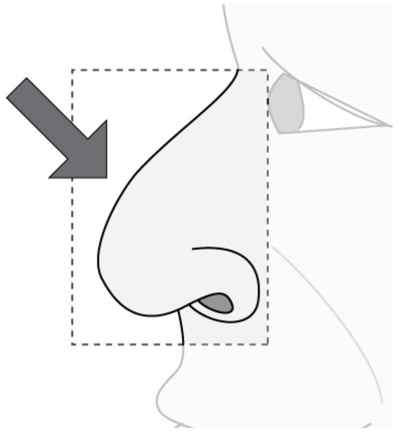
Use Python's Nose library



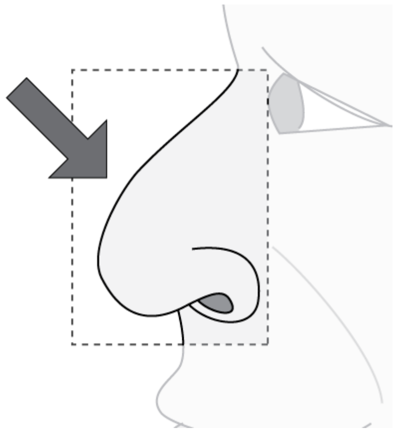
Nose

Each test is a function


Nose

Each test is a function

– Whose name begins with test_



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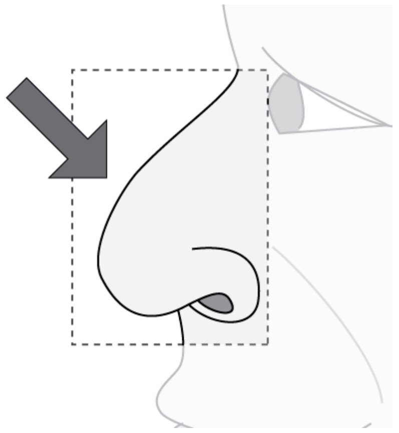
Group related tests in files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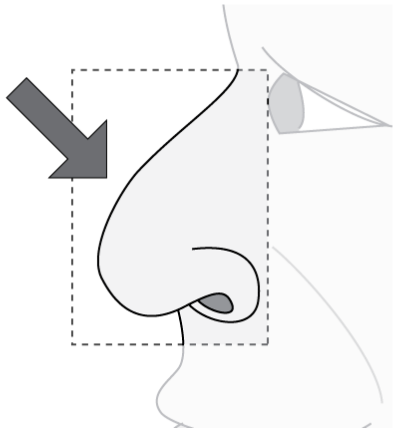
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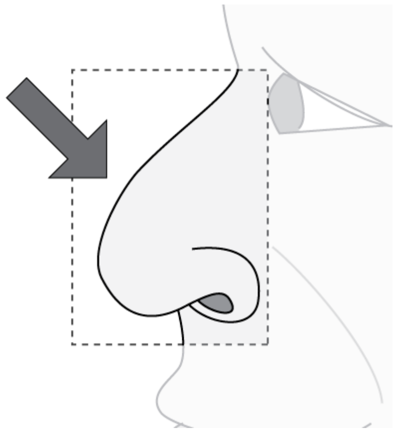
Run the command nosetests



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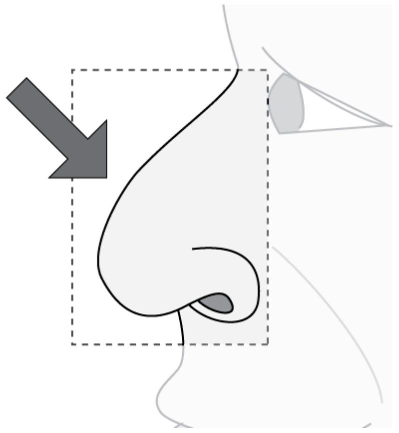
– Which automatically search the current directory and sub-directories for tests


Nose

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How many?

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How to choose cost-effective tests?

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How to choose cost-effective tests?

If we test `dna_starts_with('atc', 'a’)`

we're unlikely to learn much from testing

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Look for *boundary cases*

Simple example: testing dna_starts_with

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```
def test_starts_with_itself():
  dna = 'actgt'
  assert dna_starts_with(dna, dna)

def test_starts_with_single_base_pair():
  assert dna_starts_with('actg', 'a')

def does_not_start_with_single_base_pair():
  assert not dna_starts_with('ttct', 'a')
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Give tests meaningful names

Simple example: testing dna_starts_with

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Use assert to check results

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Use variables for fixtures to prevent typing mistakes

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Test lots of cases

How does this work in practice?

Exercise 2:

#1 write tests for the function dna_starts_with

on a separate folder, name the file test_dna_starts.py

#2 redirect terminal to the test folder and

run the tests from the command line by typing the

command nosetests

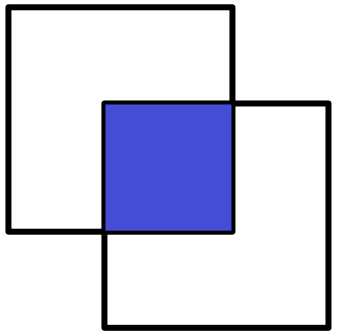
#3 green sticky up note if you got a test report.

Hint: do not forget to call the functions at the end of your

py program

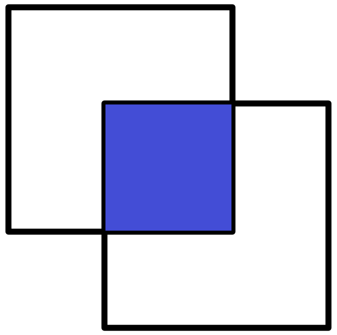
Back to Saskatchewan

Apply this to overlapping rectangles



A "normal" case

Apply this to overlapping rectangles



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What else would be useful?

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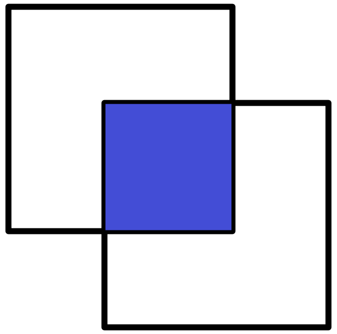

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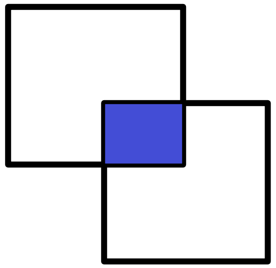

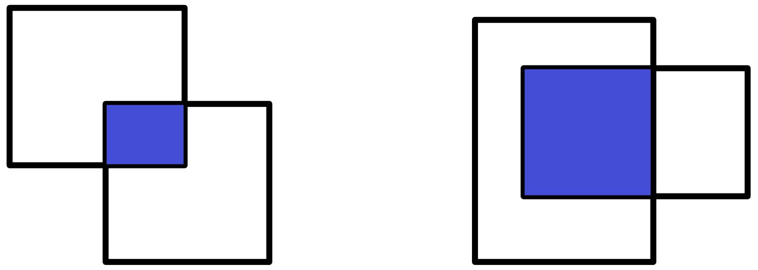

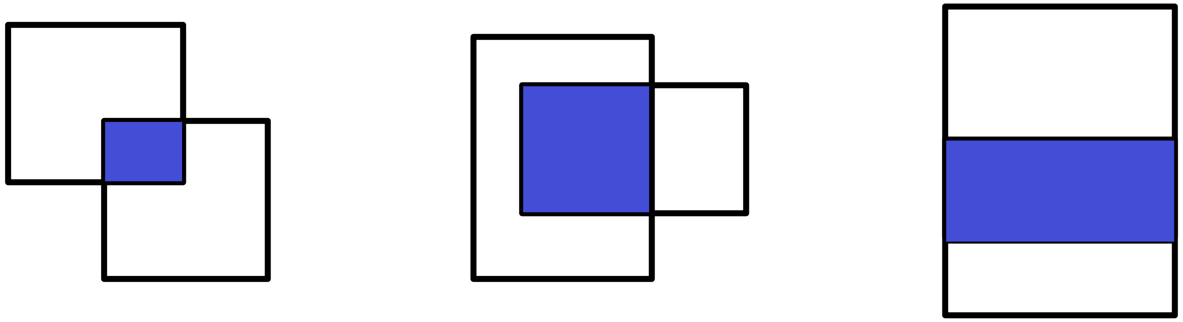

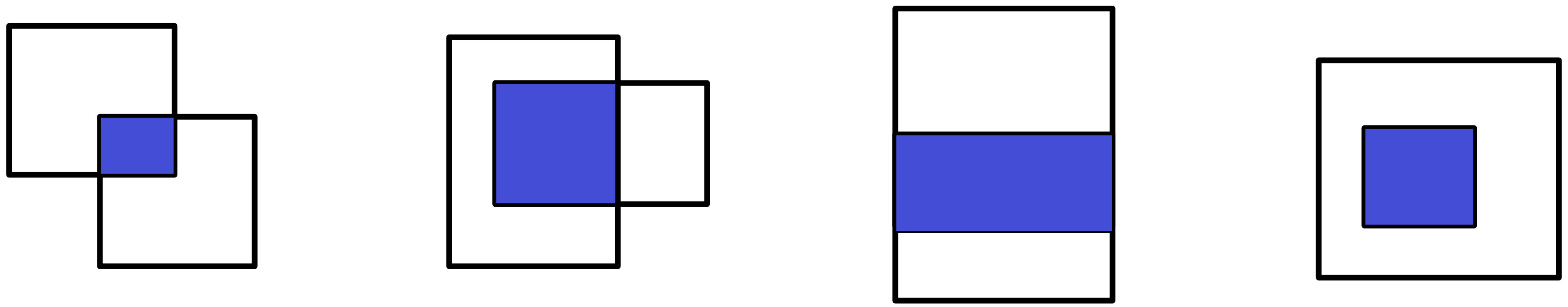

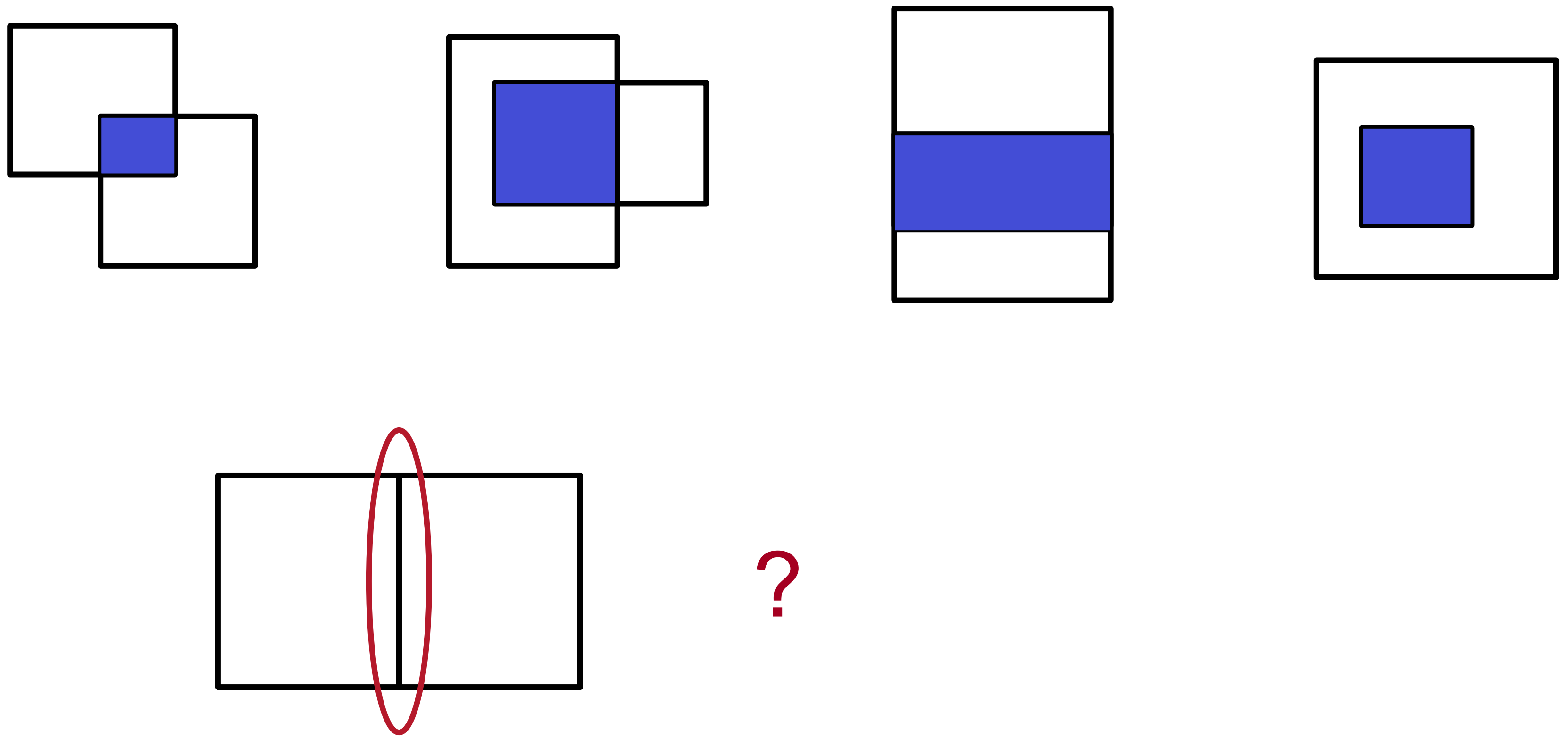

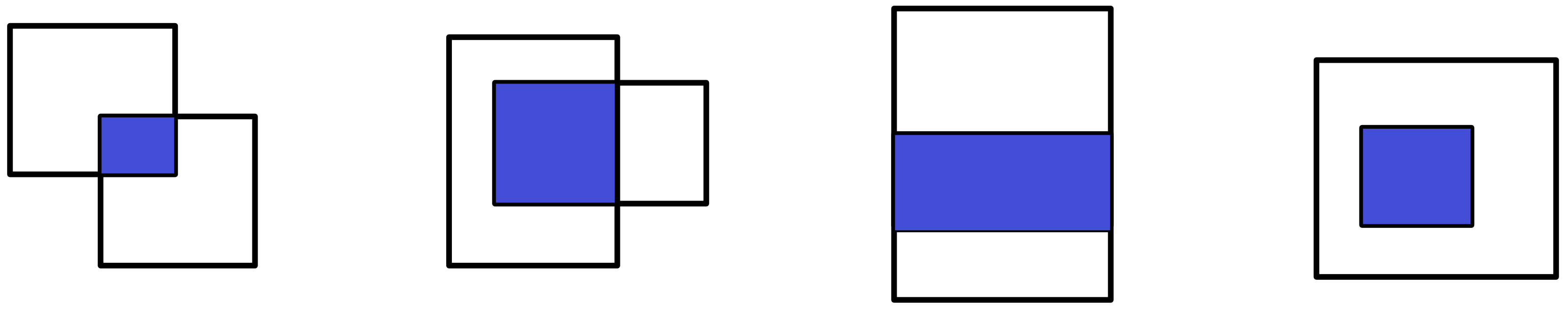

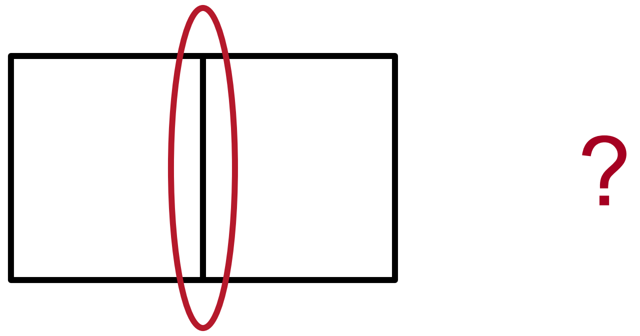

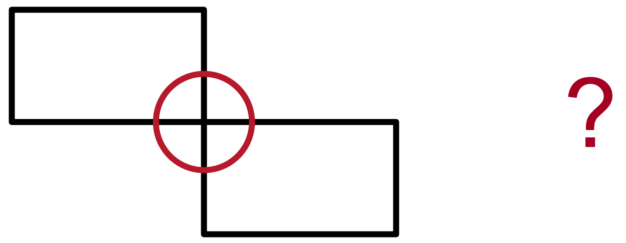

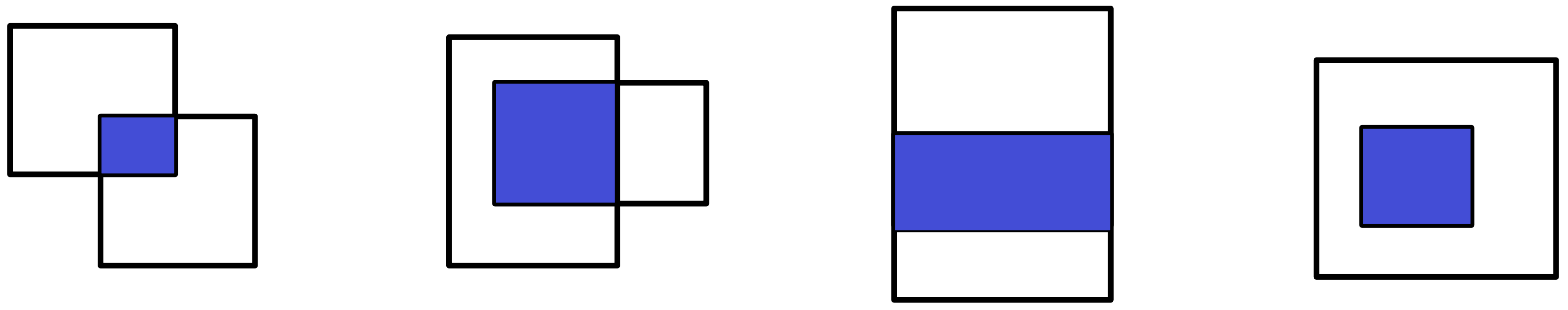

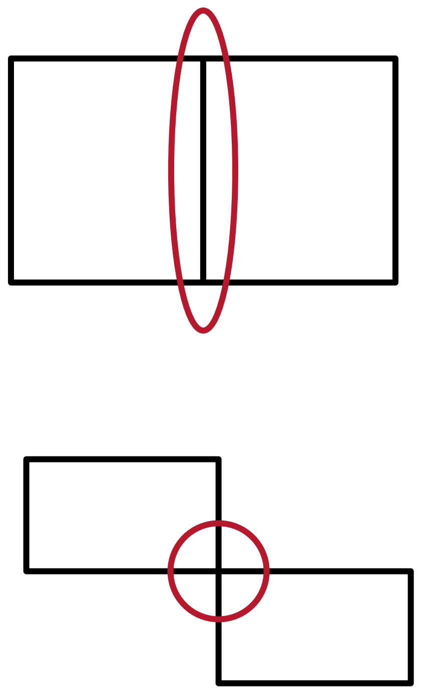

Tests help us define what "correct" actually means

Turn this into code

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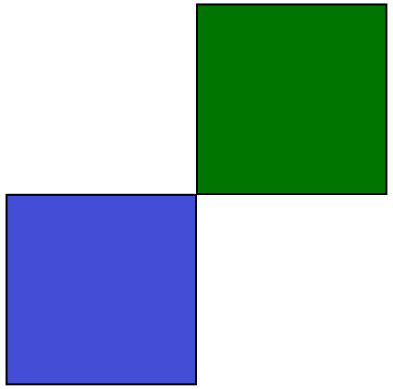
```
def test_touch_on_corner():
  one = ((0, 0), (1, 1))
  two = ((1, 1), (2, 2))
  assert overlap(one, two) == None
```



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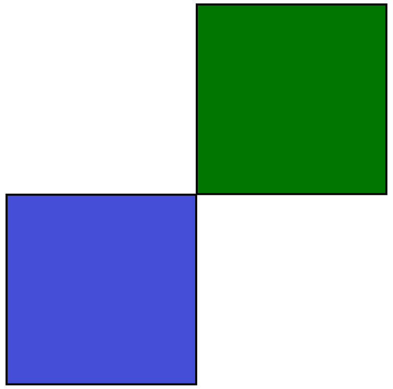
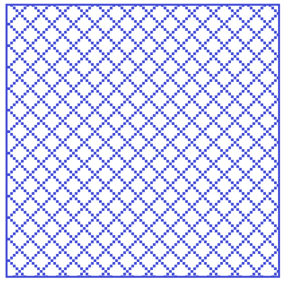


An unambiguous, runnable answer to our question about touching on corners

```
def test_unit_with_itself():
  unit = ((0, 0), (1, 1))
  assert overlap(unit, unit) == unit
```



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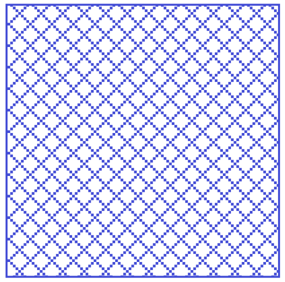
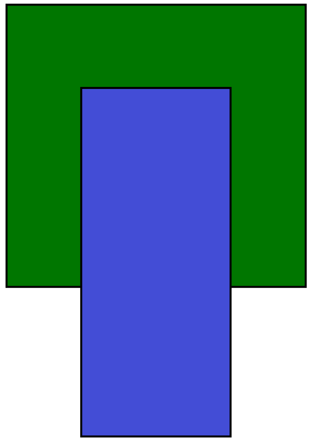


Wasn't actually in the set of test cases

we came up with earlier



```
def test_partial_overlap():
  red = ((0, 3), (2, 5))
  blue = ((1, 0), (2, 4))
  assert overlap(red, blue) == ((1, 3), (2, 4))
```

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"The tool shapes the hand"

Created by Greg Wilson (Aug 2010)
Modified by Diego Barneche (Sept 2013)