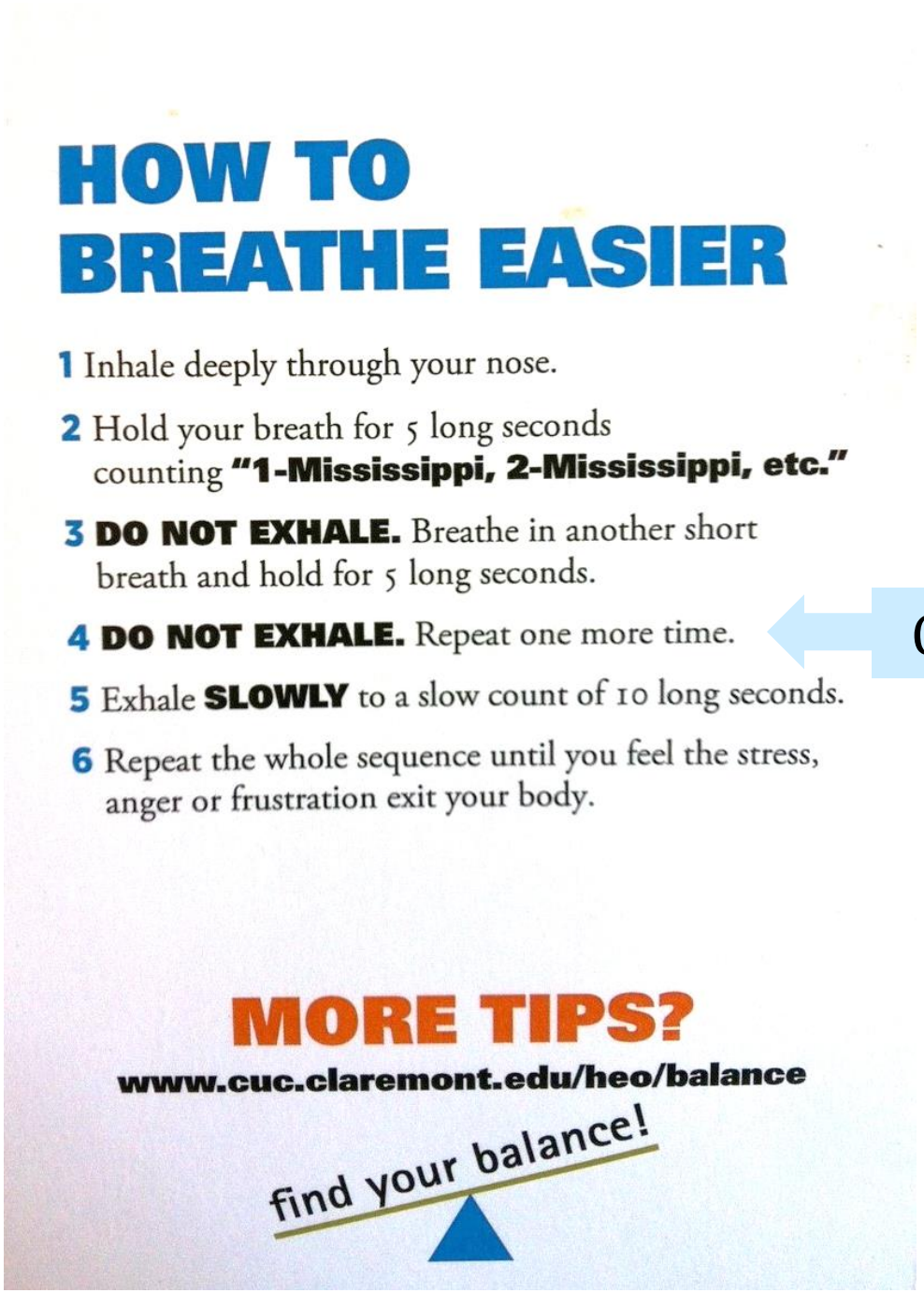
Thinking in *loops*

`for`	`while`
definite iteration	***indefinite iteration***
For a **known** list or # of iterations	For an **unknown** number of iterations

Loops are familiar ?



Careful here!

Loops are familiar ?

HOW TO BREATHE EASIER

1 Inhale deeply through your nose.

2 Hold your breath for 5 long seconds counting **"1-Mississippi, 2-Mississippi, etc."**

3 **DO NOT EXHALE.** Breathe in another short breath and hold for 5 long seconds.

4 **DO NOT EXHALE.** Repeat one more time.

5 Exhale **SLOWLY** to a slow count of 10 long seconds.

6 Repeat the whole sequence until you feel the stress, anger or frustration exit your body.

MORE TIPS?

www.cuc.claremont.edu/heo/balance

find your balance!



Hw9 Pr2

Pi from Pie?



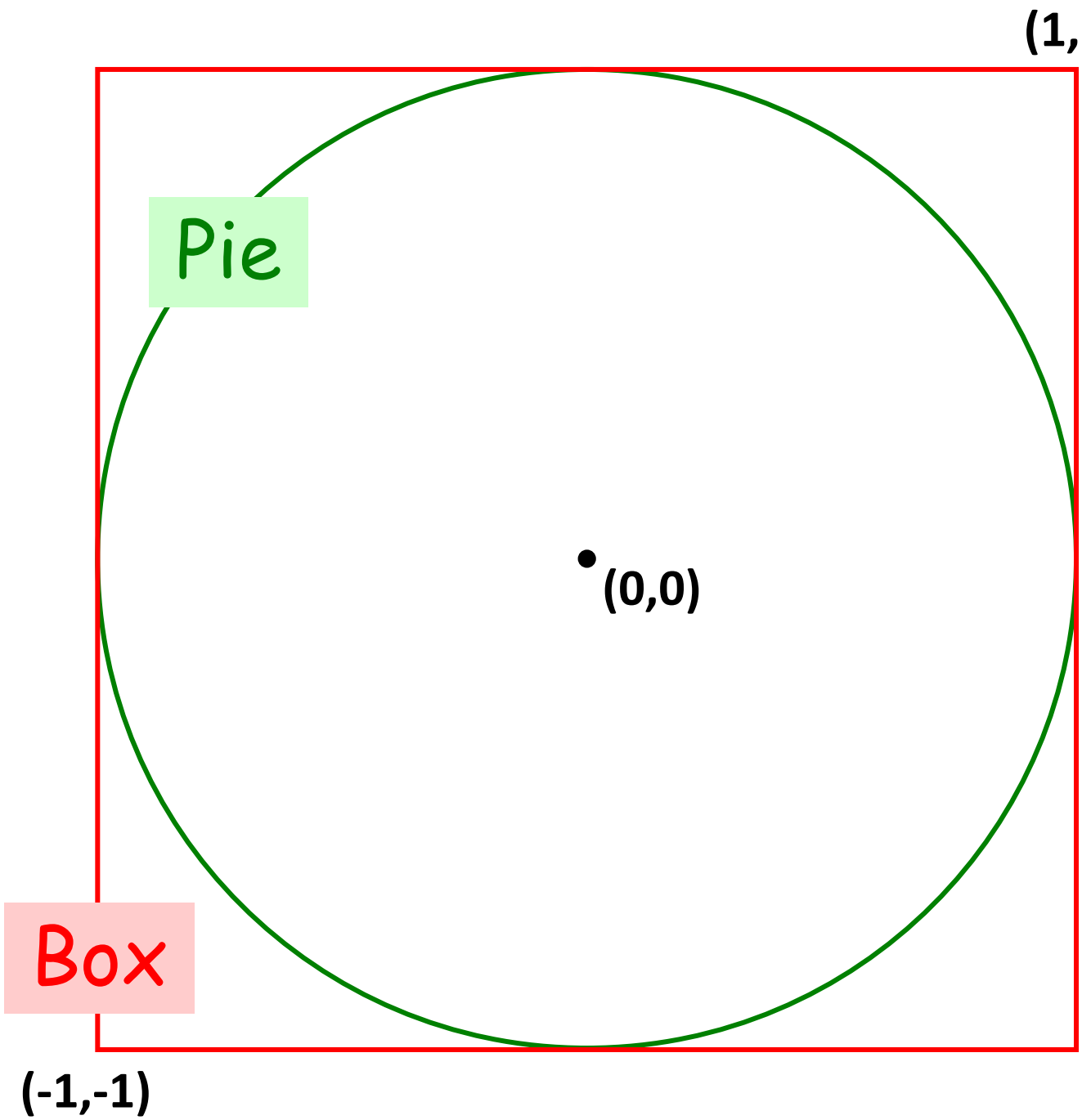


π

Pizza is the universal constant, after all…

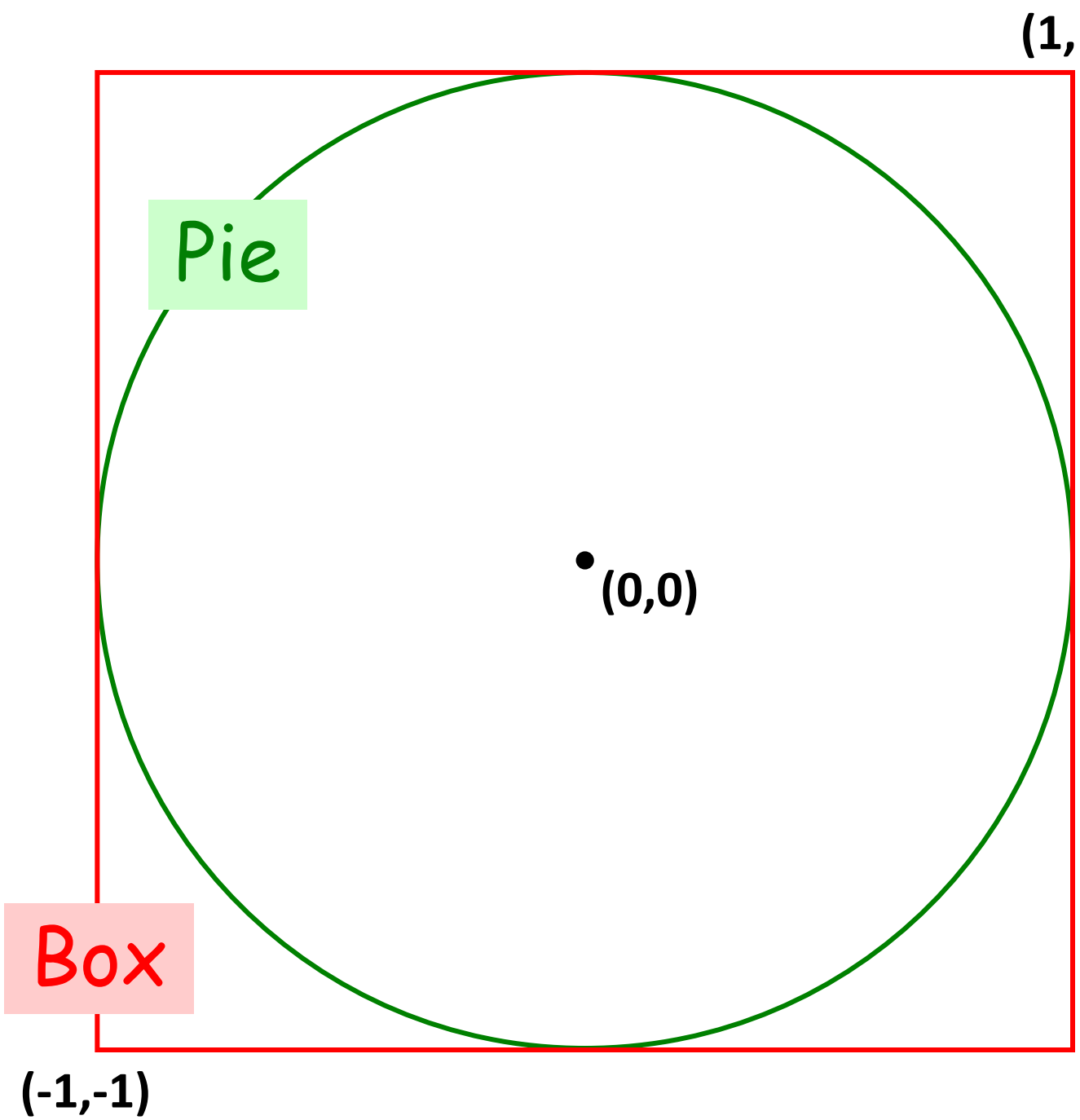


Hw9 Pr2



Estimating π from pie?

What if we just throw darts at this picture?



Estimating π from pie?

(1) Suppose you throw 100 darts at the square (*all of them hit the square*)

(2) Suppose 80 of the 100 hit <u>inside</u> the circle.

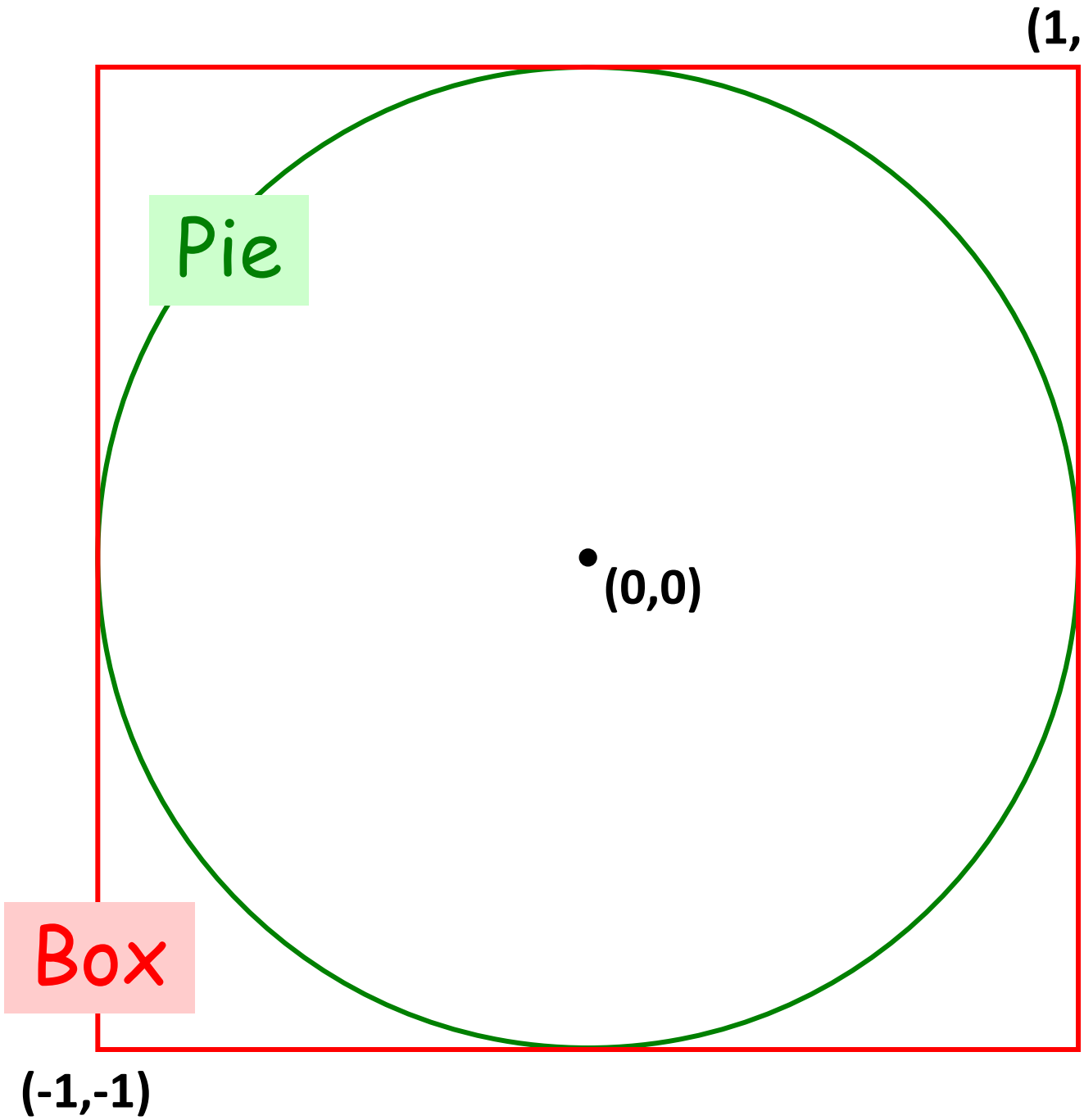
(3) How could you estimate π from these throws?

Hints

How big is a side of the square? its area?

How big is the radius of the circle? its area?

How do these help!?



Hw8 Pr2

Estimating π from pie!

$$\frac{\text{area}}{\text{area}} = \frac{\pi}{4}$$

$$\pi \sim \frac{4 * \text{hits}}{\text{hits}}$$

Loops: `for` or `while`?

`pi_one(e)`

e == how close to π we need to get

`pi_two(n)`

n == number of darts to throw

Which function will use which kind of loop?

Loops: `for` or `while`?

`pi_one(e)`

`while`

e == how close to π we need to get

`pi_two(n)`

`for`

n == number of darts to throw

Nested loops are familiar, too!

```
for min in range(60):
    for sec in range(60):
        tick()
```

Nested loops are familiar, too!

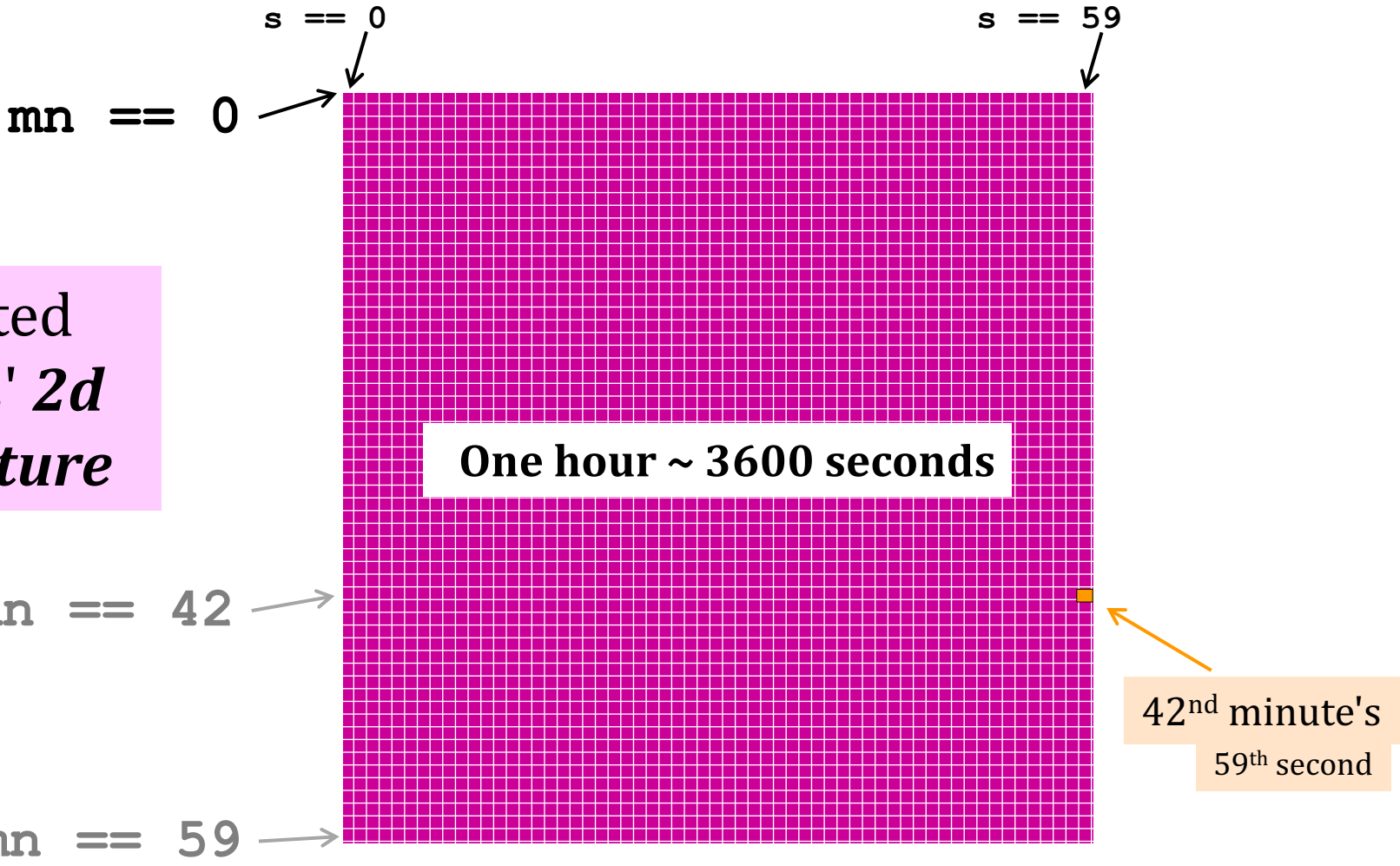


Nested loops

Life clock




```
for y in range(84):
    for m in range(12):
        for d in range(f(m,y)):
            for h in range(24):
                for min in range(60):
                    for s in range(60):
                        tick()
```



Nested loops' ***2d structure***

```
for min in list range(60):
    for s in list range(60):
        tick()
```

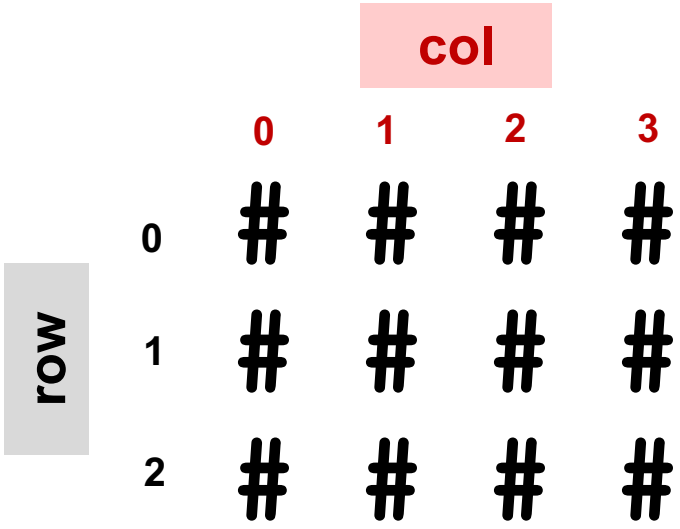
Nested loops via ASCII Art





That's my ***type*** of alien!

Creating 2d structure




```
for row in range(3):
    for col in range(4):
        print("#")
```

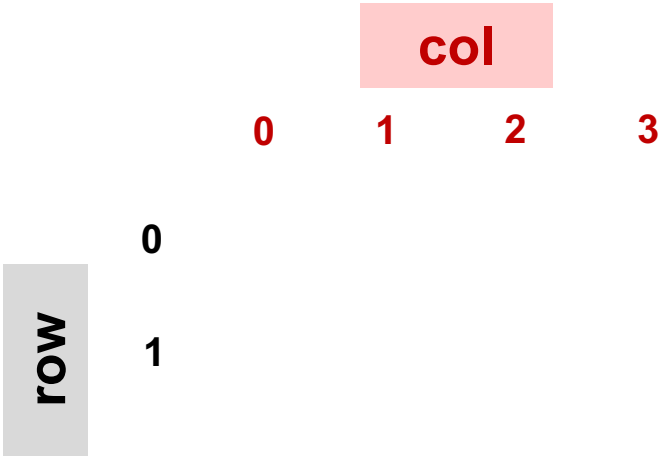
Wait! this needs something more...



Creating 2d structure

```
                [0,1,2]
for row in range(3):
                      [0,1,2,3]
    for col in range(4):
      print('#',end = '')

    print() # Blank line
```




```
row =
    col =
    col =
    col =
    col =

row =
    col =
    col =
    col =
    col =

row =
    col =
    col =
    col =
    col =
```

Creating 2d structure

```
                [0,1,2]
for row in range(3):
                      [0,1,2,3]
    for col in range(4):
      print('#',end = '')

    print() # Blank line
```

```
row = 0
    col = 0
    col = 1
    col = 2
    col = 3

row = 1
    col = 0
    col = 1
    col = 2
    col = 3

row = 2
    col = 0
    col = 1
    col = 2
    col = 3
```

col

```
   0123
0  ####
1  ####
2  ####
```

row

Creating 2d structure

Let's take an alien's-eye view!



```
for row in range(3):
    for col in range(4):
        if col == row:
            print('#',end = '')
        else:
            print(' ',end = '')
    print()
```

col

```
   0123
0  #
1   #
2    #
```

row

```
row = 0
    col = 0
    col = 1
    col = 2
    col = 3

row = 1
    col = 0
    col = 1
    col = 2
    col = 3

row = 2
    col = 0
    col = 1
    col = 2
    col = 3
```

Match!

What code creates the fourth one?

* and ** are extra!

A

```
for r in range(3):          [0,1,2]
  for c in range(6):
    if c > r:               [0,1,2,3,4,5]
      print('#',end='')
    else:
      print(' ',end='')
  print()
```

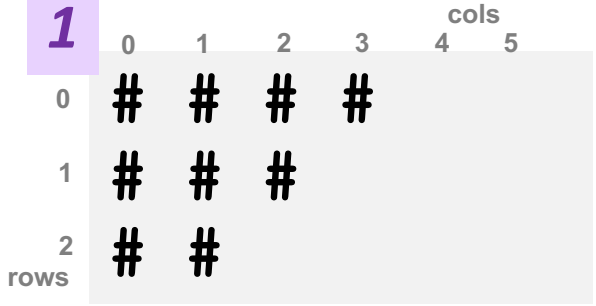
B

```
for r in range(3):
  for c in range(6):
    if c%2 == 1:
      print('#',end='')
    else:
      print(' ',end='')
  print()
```

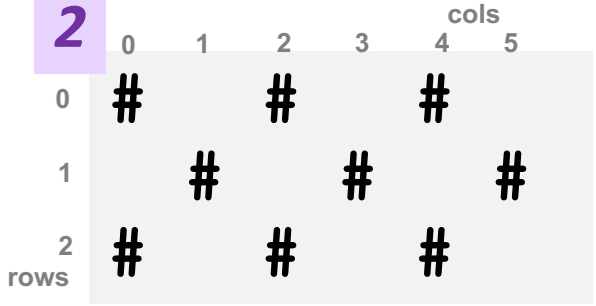
C

```
for r in range(3):
  for c in range(6):
    if c%2 == r%2:
      print('#',end='')
    else:
      print(' ',end='')
  print()
```

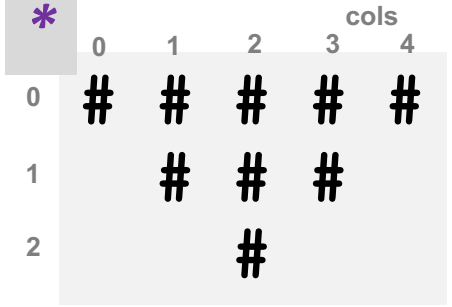
1



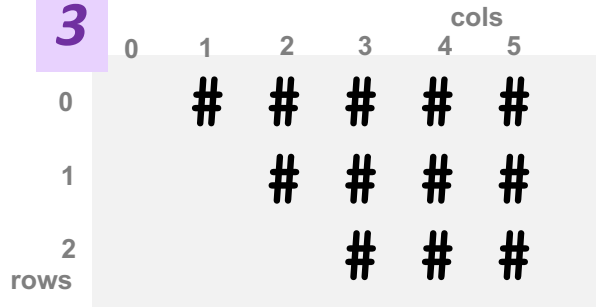
2



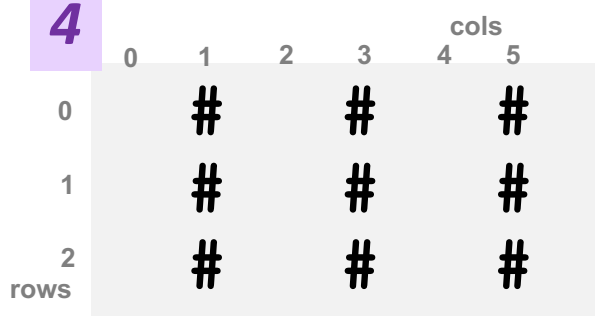
***



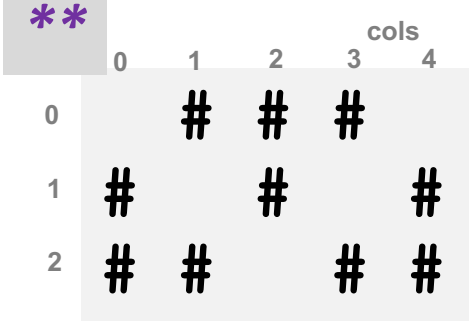
3



4



****



Match!

What code creates the fourth one?

* and ** are extra!

A

```
for r in range(3):          [0,1,2]
  for c in range(6):
    if c > r:               [0,1,2,3,4,5]
      print('#',end='')
    else:
      print(' ',end='')
  print()
```

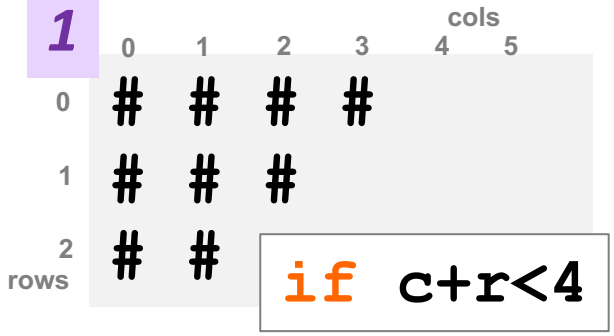
B

```
for r in range(3):
  for c in range(6):
    if c%2 == 1:
      print('#',end='')
    else:
      print(' ',end='')
  print()
```

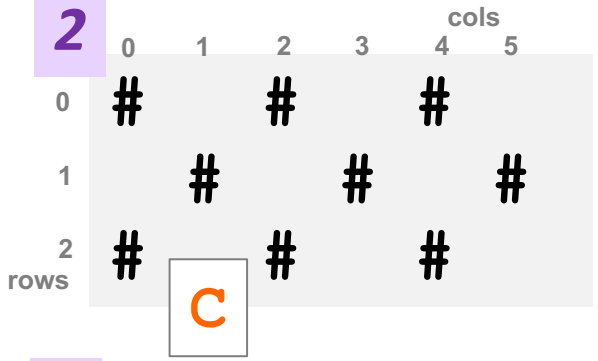
C

```
for r in range(3):
  for c in range(6):
    if c%2 == r%2:
      print('#',end='')
    else:
      print(' ',end='')
  print()
```

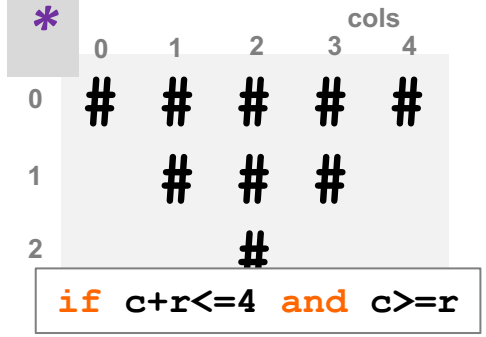
1



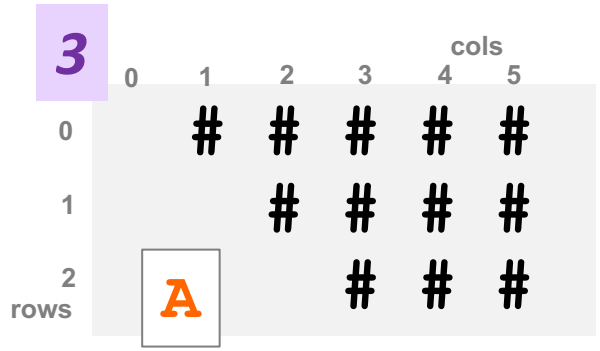
2



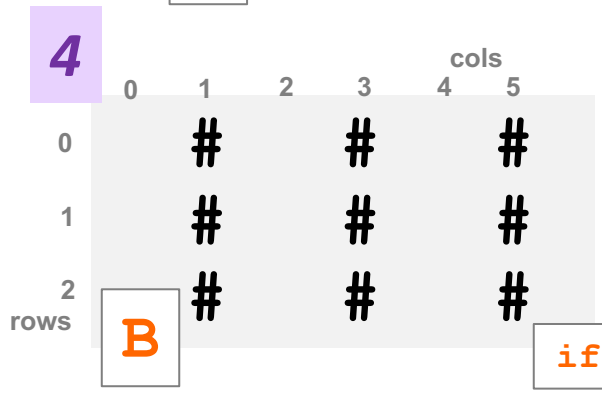
*****



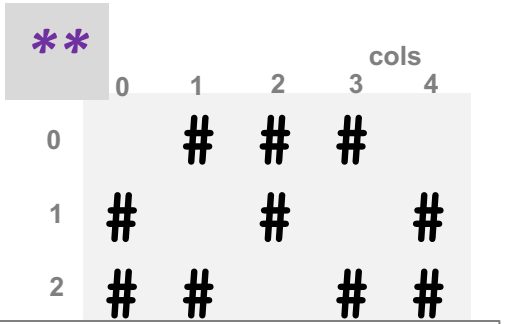
3

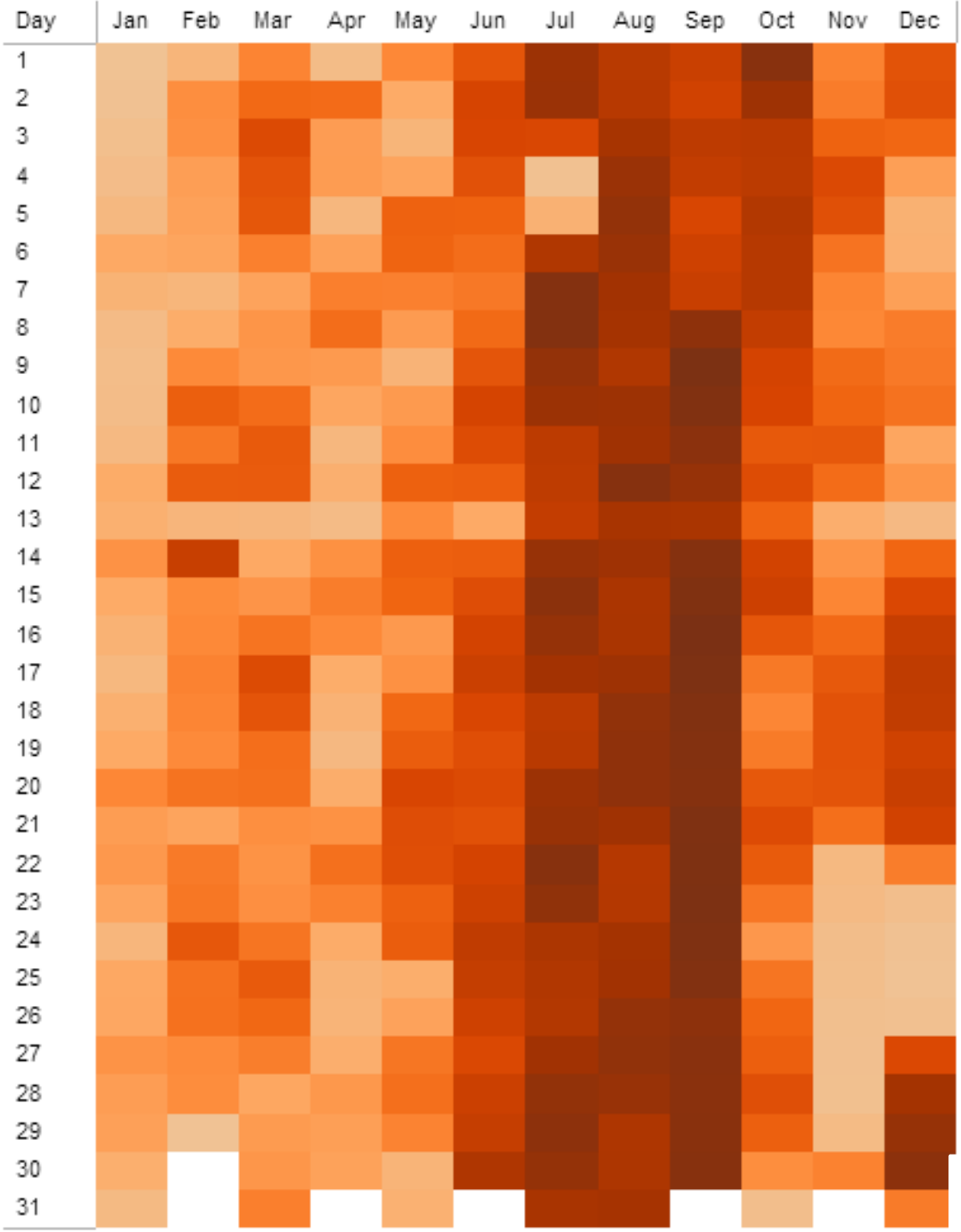


4



******





Nested loops' *2d structure*

```
for m in range(1,13):
    for d in range(f(m)):
        num_bdays(m,d)
```

What trends appear in this birthday data?

Data represents the # of babies born in the United States between 1973 and 1999

Source:
Amitabh Chandra
Harvard University
via NYTimes.com

vizwiz.blogspot.com/2012/05/how-common-is-your-birthday-find-out.html