[301] Iteration 1

Tyler Caraza-Harter

Learning Objectives Today

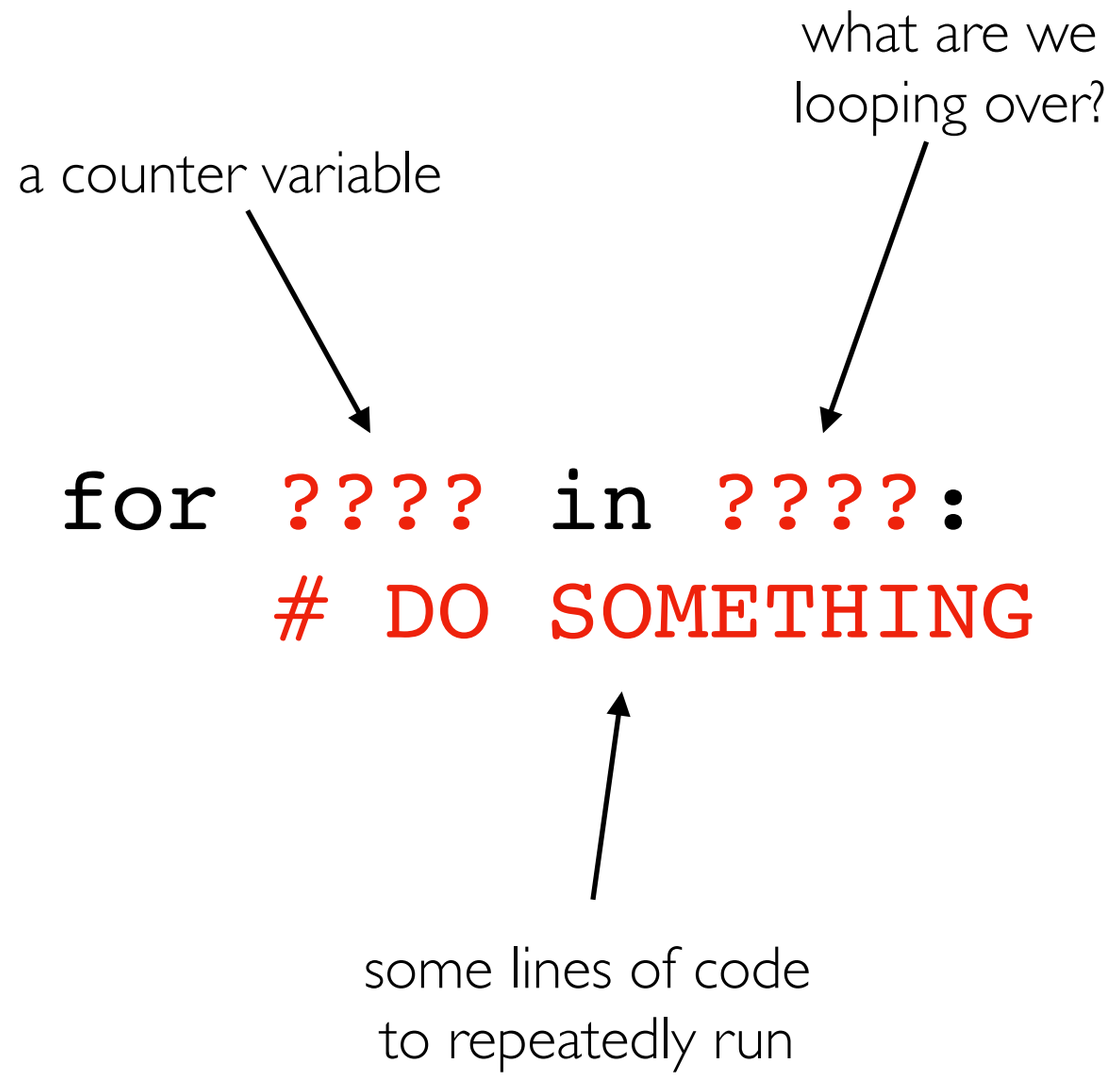
Loops: how to run same code many times

"for" loop (today), "while" loop (next time)

Use cases:

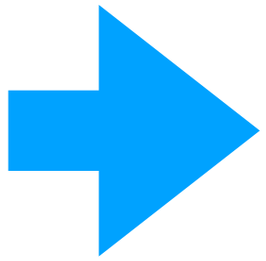
- Tables: rows and columns
- Calculus: max/min, area under the curve
- Stastistics: randomness, simulation, significance

For Loop Syntax



For Loop Syntax

```
print("A")
print("B")
print("A")
print("B")
print("A")
print("B")
```



```
for num in range(3):
    print("A")
    print("B")
```

a counter variable

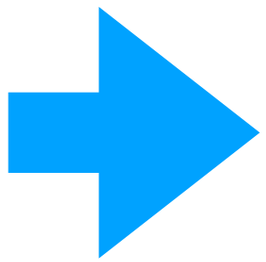
what are we looping over?

some lines of code to repeatedly run

For Loop Syntax

```
print(0)
print(1)
print(2)
```

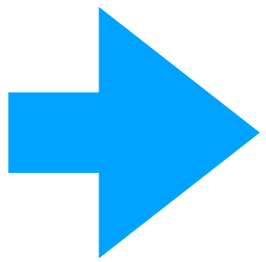
careful!



```
for num in range(3):
    print(num)
```

For Loop Syntax

```
print(1)
print(2)
print(3)
```

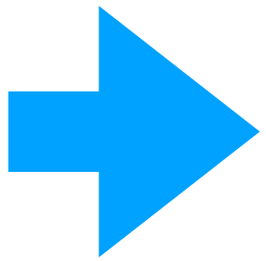


```
for num in range(3):
    print(num+1)
```

For Loop Syntax

"i" is a traditional variable name for counting

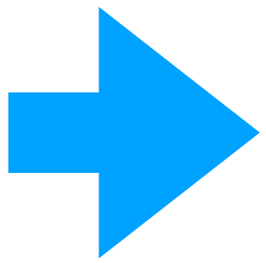
```
print(1)
print(2)
print(3)
```



```
for i in range(3):
    print(i+1)
```

For Loop Syntax

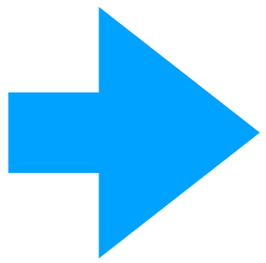
```
print(1)
print(1)
print(2)
print(2)
print(3)
print(3)
```



```
for i in range(3):
    print(i+1)
    print(i+1)
```

For Loop Syntax

```
print(1)
print(1)
print(2)
print(2)
print(3)
print(3)
```



```
for i in range(3):
    for j in range(2):
        print(i+1)
```

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Demo: Checker Board

```
# # # # # # # #
 # # # # # # # #
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# # # # # # # #
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# # # # # # # #
 # # # # # # # #
```

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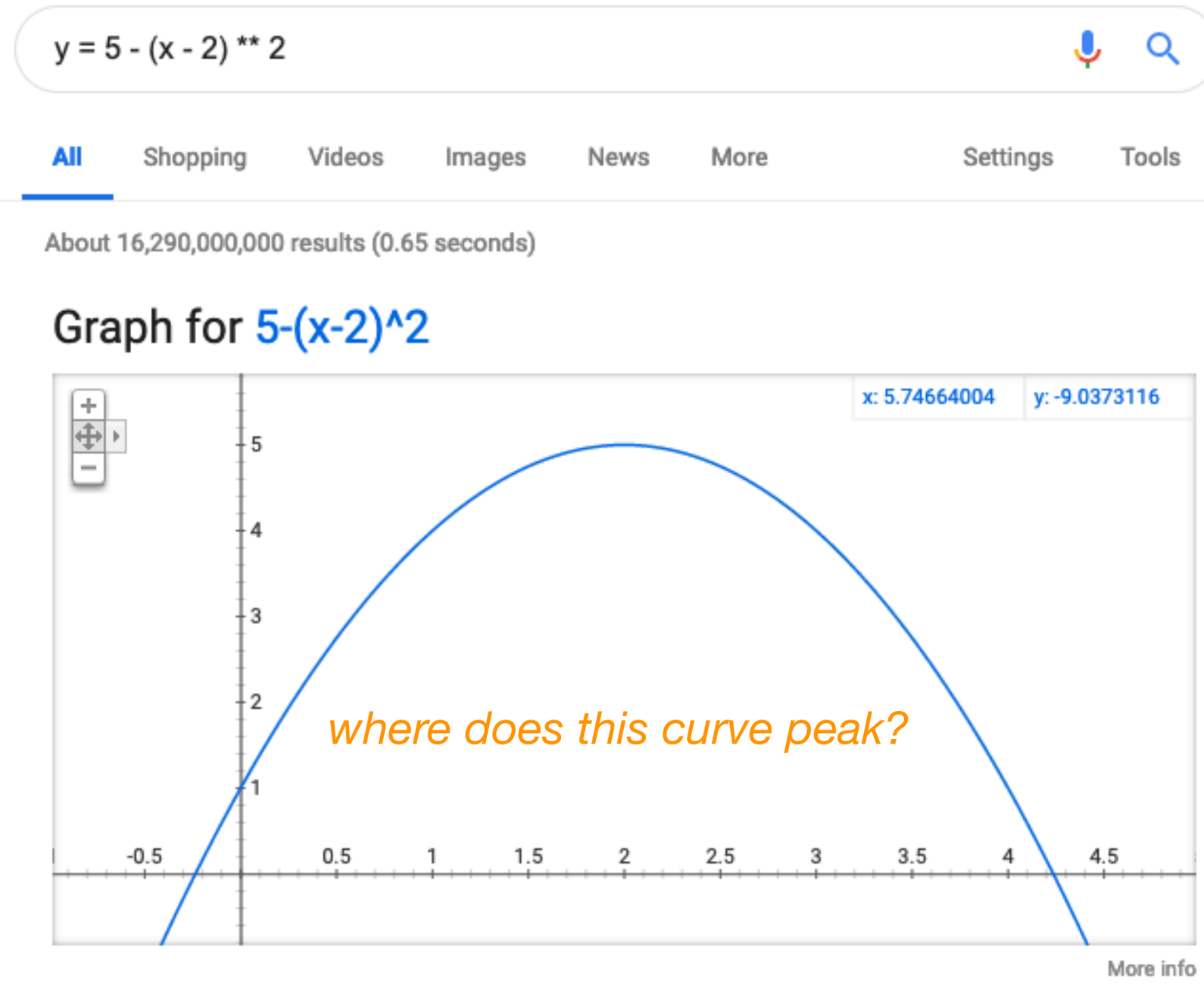
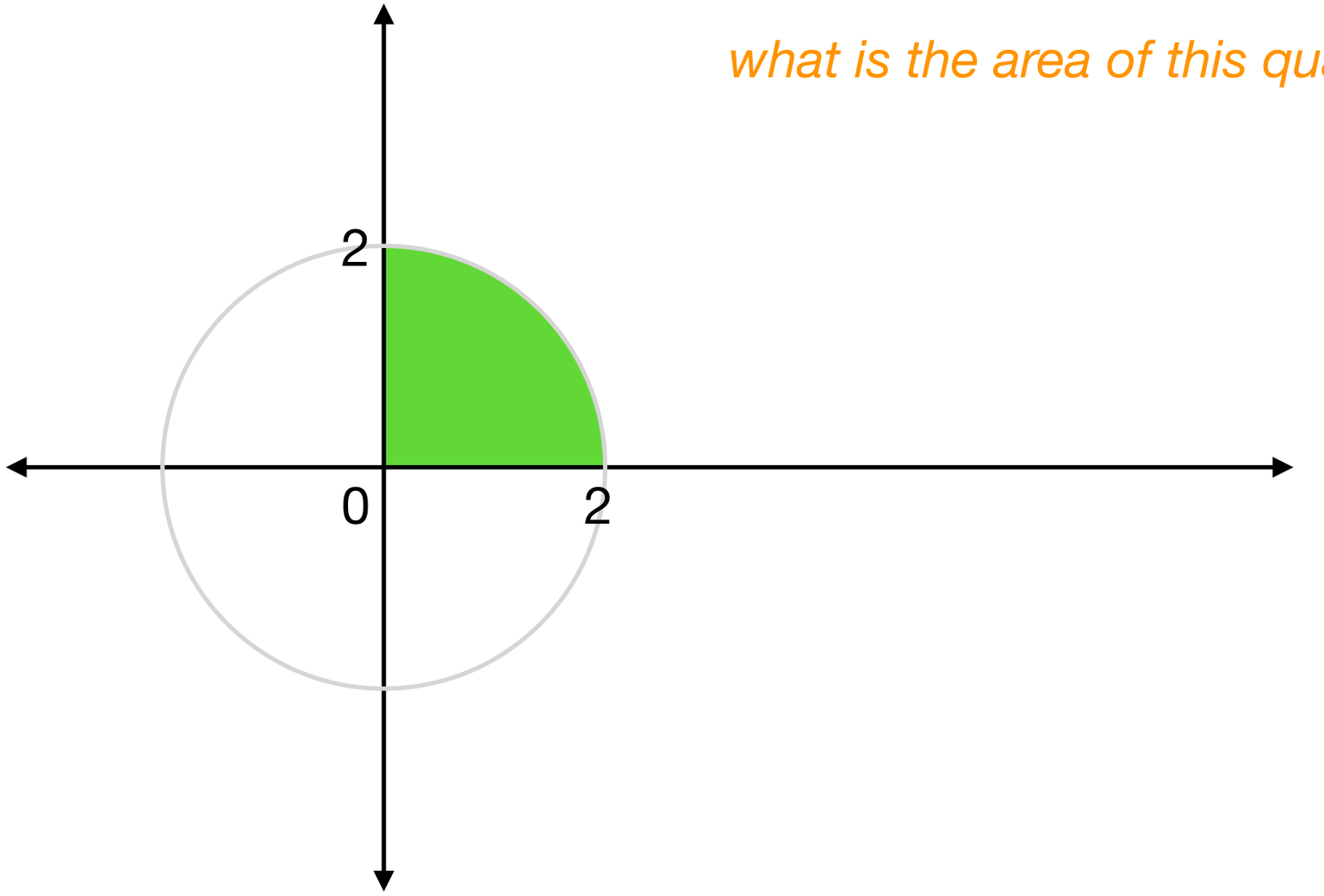
Demo: Maximum (Finding the Peak)

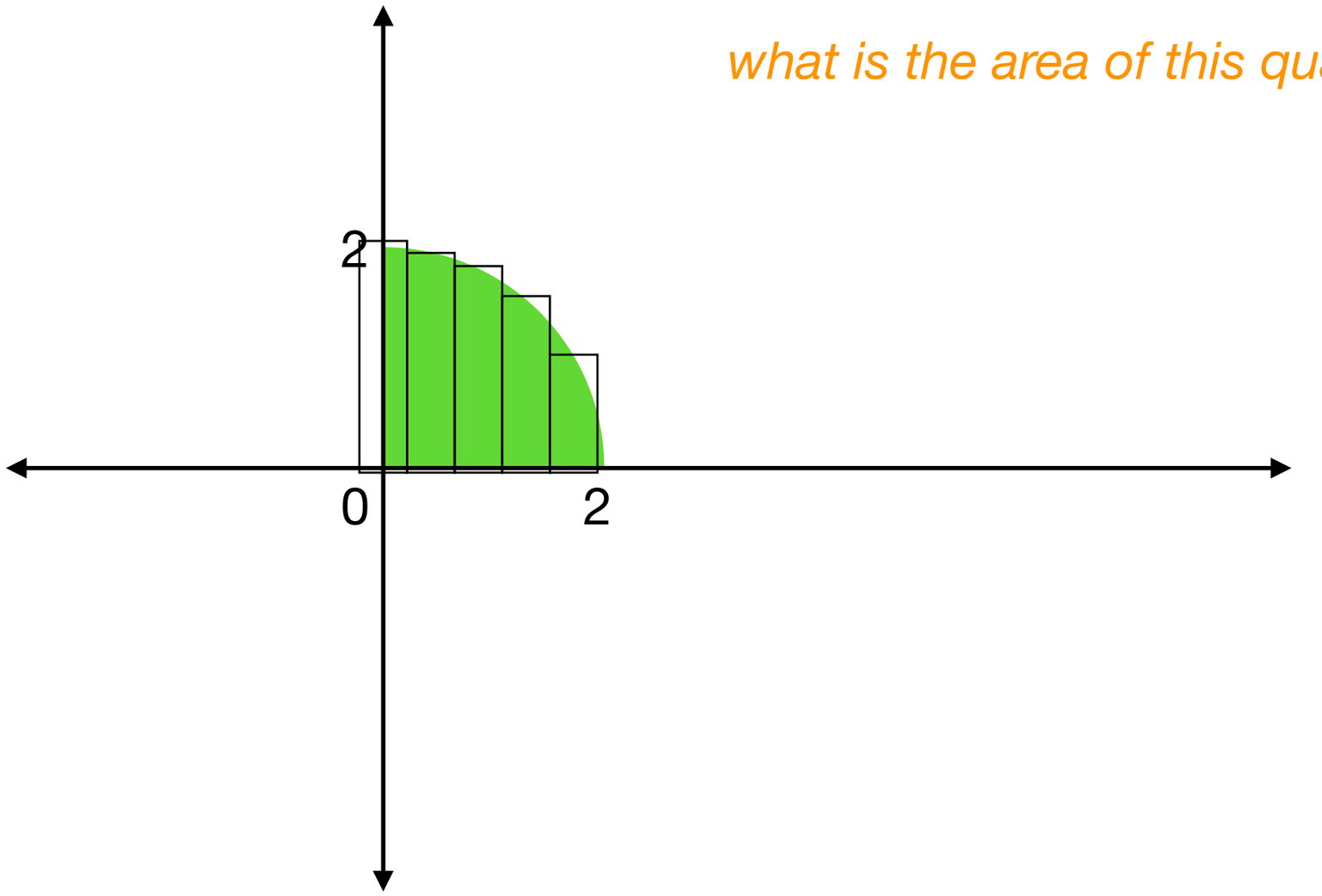


Demo: Integration (Finding the area)



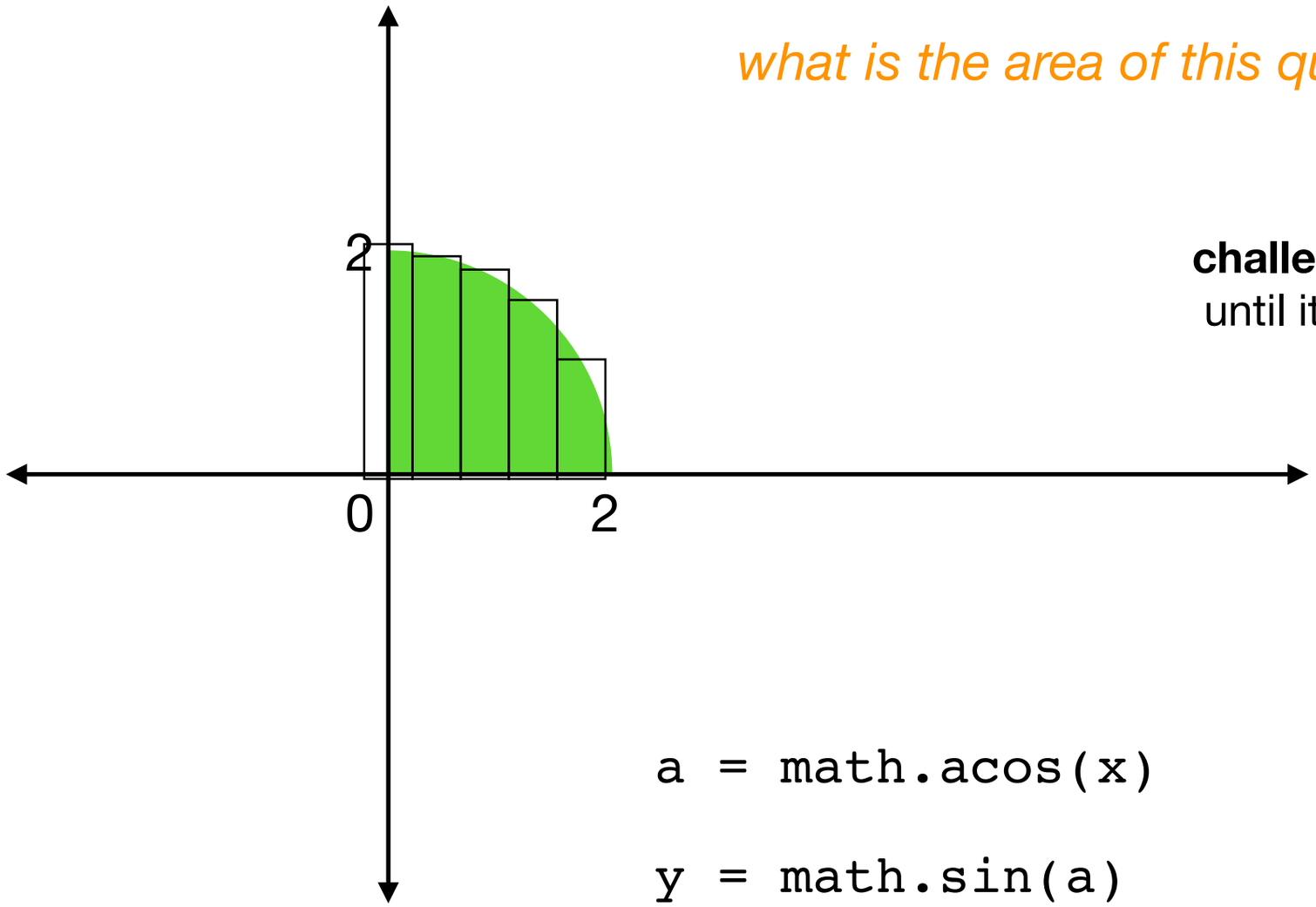
what is the area of this quarter circle?

Demo: Integration (Finding the area)



what is the area of this quarter circle?

Demo: Integration (Finding the area)

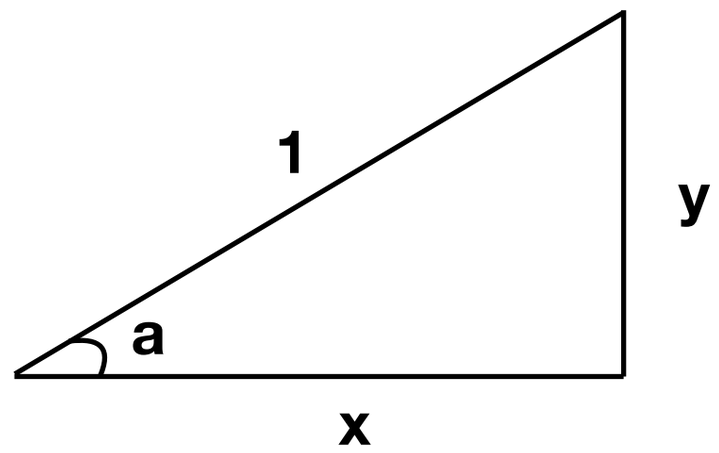


what is the area of this quarter circle?

challenge: keep using narrower slices until it doesn't make much difference

```
a = math.acos(x)

y = math.sin(a)
```



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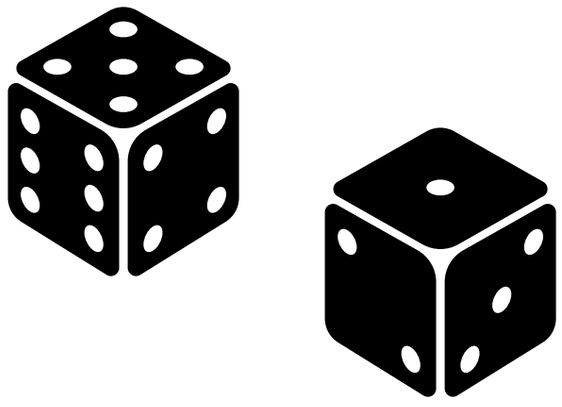
Demo: Dice



What is the average for a fair toss?

```
import random
die1 = random.randint(1, 6)
die2 = random.randint(1, 6)
total = die1 + die2
```

Demo: Suspicious Coin

51 **49**

Not too surprising

75 **25**

Hmmm.... How often does this happen with a fair coin?

Toss 100 coins, one million times