

Iteration

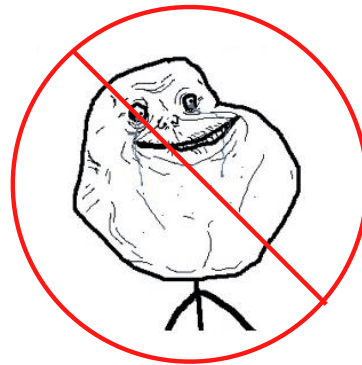
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## Announcements

## Office Hours: You Should Go!

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**You are not alone!**

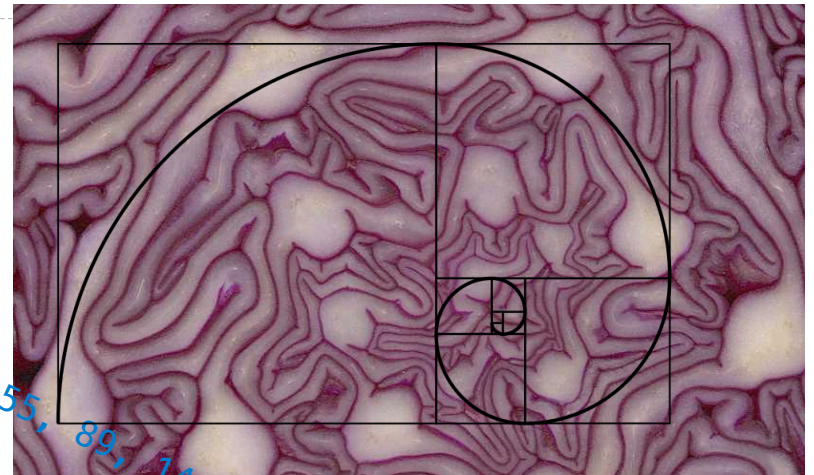


<http://cs61a.org/office-hours.html>

## Iteration Example: Fibonacci Numbers

# The Fibonacci Sequence

0 1 2 3 4 5 6 7 8 ...  
0, 1, 1, 2, 3, 5, 8, 13, 21, 34, ...  
1 0 1 1 2 3 5 8 13 21 34 55 89 144 233 377 610 987



```
def fib(n):  
    """Compute the nth Fibonacci number.  
  
    >>> fib(0)  
    0  
    >>> fib(8)  
    21  
    """  
    k, kth, difference = 0, 0, 1  
    while k < n:  
        kth, difference = kth + difference, kth  
        k = k + 1  
    return kth
```

```
old_diff = difference  
difference = kth  
kth = kth + old_diff
```

```
kth = kth + difference  
difference = kth
```



Return

## Return Statements

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A return statement completes the evaluation of a call expression and provides its value

$f(x)$  for user-defined function  $f$ : switch to a new environment; execute  $f$ 's body

**return** statement within  $f$ : switch back to the previous environment;  $f(x)$  now has a value

Only one return statement is ever executed while executing the body of a function

```
def end(n, d):  
    """Print the final digits of N in reverse order until D is found.
```

```
>>> end(34567, 5)
```

```
7
```

```
6
```

```
5
```

```
"""
```

```
while n > 0:
```

```
    last, n = n % 10, n // 10
```

```
    print(last)
```

```
    if d == last:
```

```
        return None
```

(Demo)

# Self-Reference

(Demo)

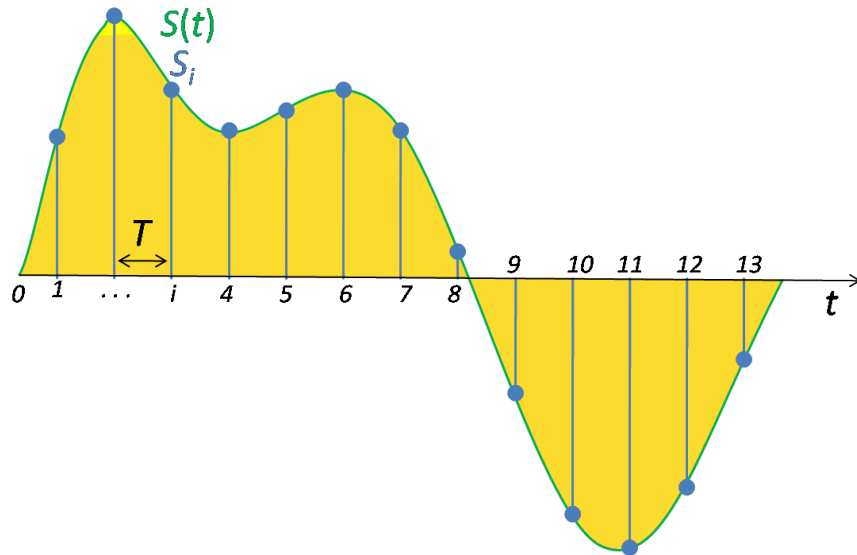




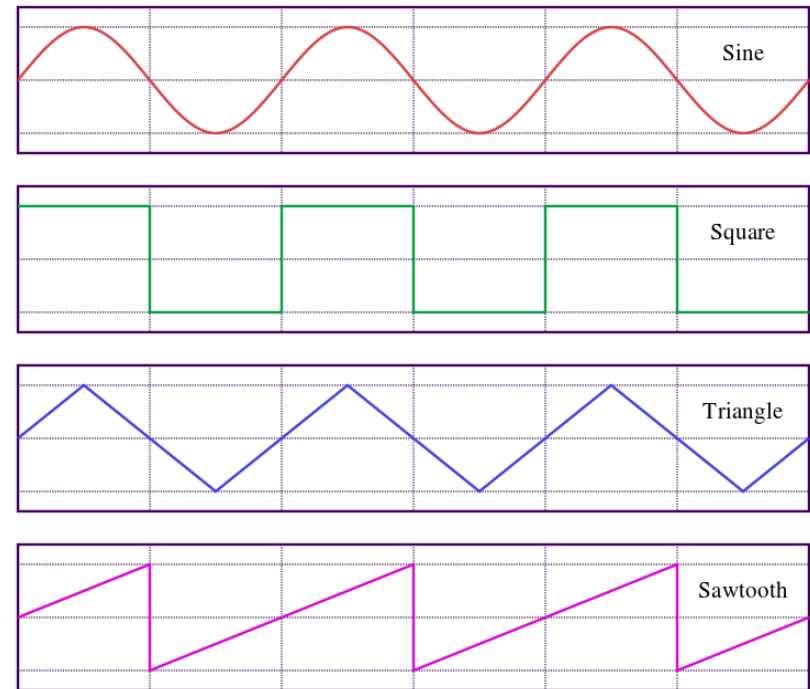
## Function Example: Sounds

## WAV Files

The Waveform Audio File Format encodes a sampled sound wave



A triangle wave is the simple wave form with the most pleasing sound



(Demo)