

# Lecture6 design

## abstraction

### functional abstractions

name some computational process and see them as a whole, without caring its inner mechanics.

#### Functional Abstractions



```
def square(x):  
    return mul(x, x)
```

```
def sum_squares(x, y):  
    return square(x) + square(y)
```

What does sum\_squares need to know about square?

- Square takes one argument. **Yes**
- Square has the **intrinsic** name square. **No**
- Square computes the square of a number. **Yes**
- Square computes the square by calling mul. **No**

```
def square(x):  
    return pow(x, 2)
```

```
def square(x):  
    return mul(x, x-1) + x
```

If the name "square" were bound to a built-in function, sum\_squares would still work identically.

- guidelines for the names of the functions.

## Choosing Names


Names typically *don't* matter for correctness  
**but**  
they matter a lot for composition

| From:       | To:          |
|-------------|--------------|
| true_false  | rolled_a_one |
| d           | dice         |
| play_helper | take_turn    |

Names should convey the *meaning* or *purpose* of the values to which they are bound.

The type of value bound to the name is best documented in a function's docstring.

Function names typically convey their effect (print), their behavior (triple), or the value returned (abs).



## which values deserves a name?

- repeated compound expressions
- meaningful parts of complex expressions
  - for example: discriminant in equation solving

## more tips

- names can be long if they help document your code
  - average\_age in stead of aa or sth else
- names can be short if they represent generic quantities
  - x, y, z-- real numbers
  - .....

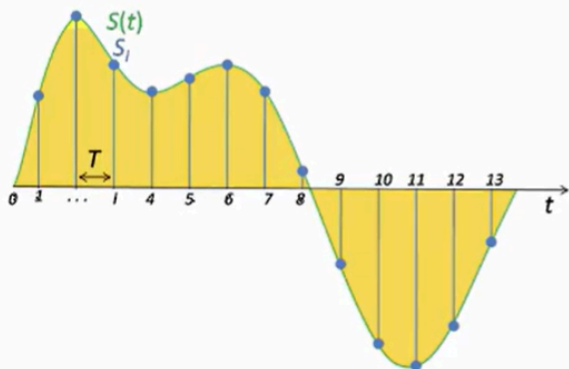
## WHY do we need higher order functions?

### function example: sound

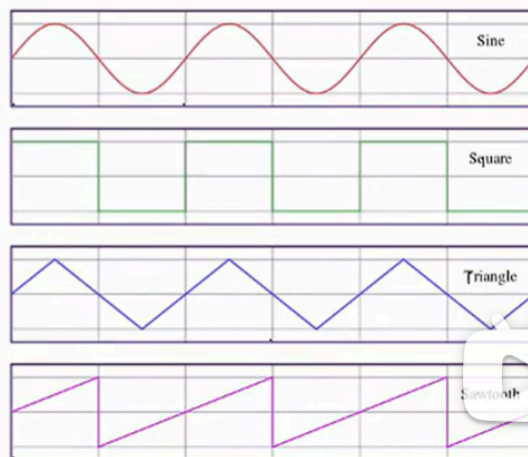
## WAV Files



The Waveform Audio File Format  
encodes a sampled sound wave



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



so that's why we're gonna use it in this demo

[https://en.wikipedia.org/wiki/Triangle\\_wave](https://en.wikipedia.org/wiki/Triangle_wave)  
[https://en.wikipedia.org/wiki/Sampling\\_\(signal\\_processing\)](https://en.wikipedia.org/wiki/Sampling_(signal_processing))

[!info]Q&A session

about inequality in python of float

$1/3 + 1/3 + 1/3$