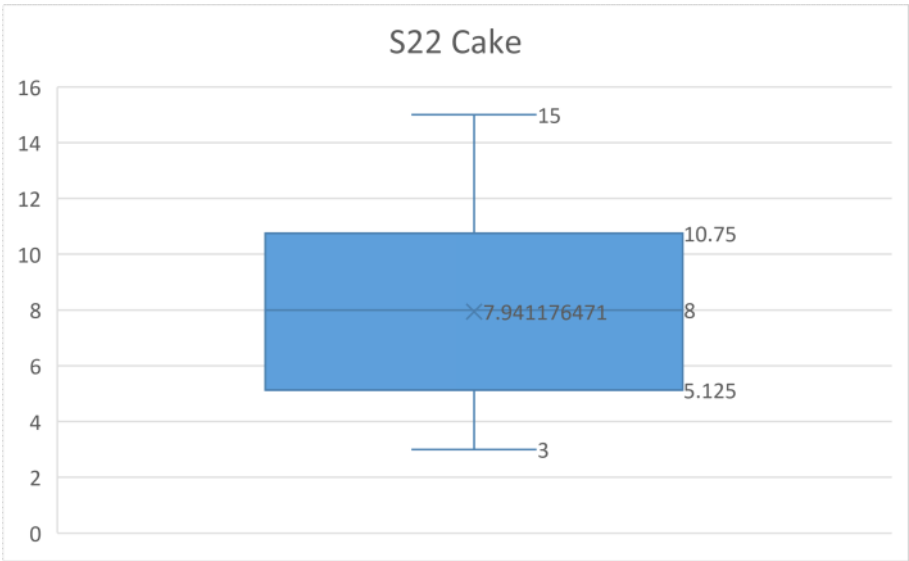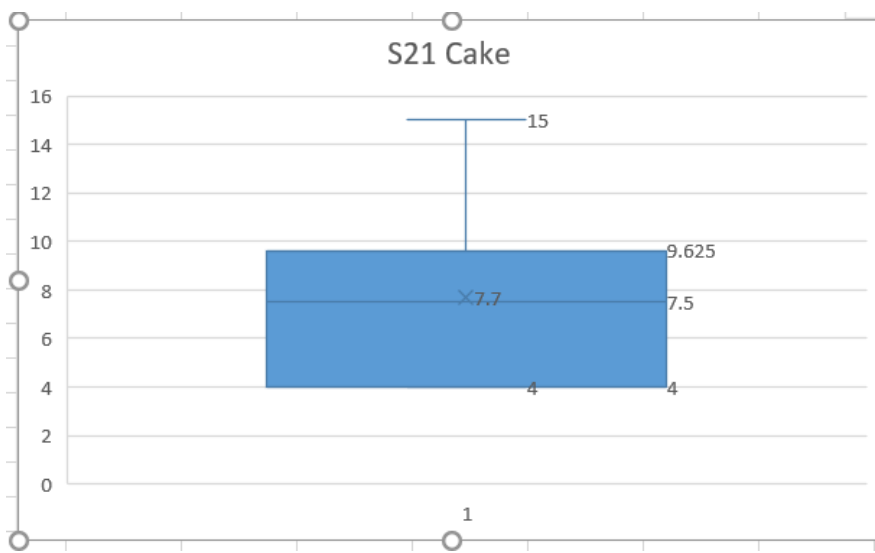# 12: functions

Tuesday, February 1, 2022   10:57 PM

Music: def leppard

A3 cake tour

Monday, October 17, 2022   11:26 AM

You will need to plan on paper
You will need to check your own
    work (you can show classmates
    your cake)

S21 Cake

15
9.625
×7.7   7.5
4   4
1

S22 Cake

15
10.75
×7.941176471   8
5.125
3

functions!

Some are built into python

- print()
- input()
- type()
- int()
- str()

others we import .

import turtle
turtle.Turtle()

import Math
Math.sqrt(4)
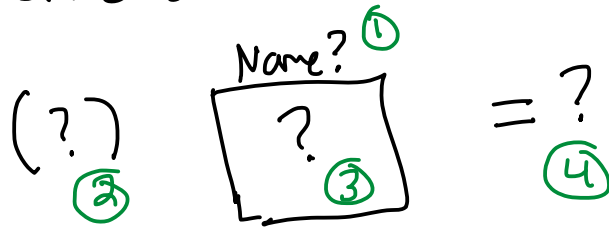
You hand it

O + info → [Does work / we don't care how] → it gives you back a return value (might be type 'none')!

But what if you Need a function that doesn't exist? Make it!

Build a function:

Name? ①

(?) ② | ? | ③   = ? ④

Parameters   Code to   return
              do work   value

def Name (parameters, optional):
①   ②
    Statements to do work ③
    return optional   ④

def leppard (lumps):
    print ("you asked for", lumps, "lumps")
    return ("sugar" * lumps)

def print_hello():
    print ("hello")

```
3   #put a comment here describing the function
4   #what the parameters are
5   #what the return is
6   def leppard(lumps):
7       print("you asked for", lumps, "lumps")
8       return("sugar " * lumps)
9
```

```
1  leppard(3)  #to call it (will this work?)
```

In chat: Thumbs will it run? No!

You need to define before call

(move: run)

what happened to the sugar it returned? You need to save it! (or you've dropped it on the ground.

```
8  tea = leppard(3)
```

```
8  tea = leppard()  #will this work?
```

⇒ missing argument

```
10  #arguments are what you send into a parameter
```

A note on designing: try to make self contained.

Breakout rooms: write a function:

```
1  #get a character from the user, then print a
2  #rectangle with 50 of the character per row
3  #for 10 rows
```

Below are some examples : print for in person ABCD from next onenote page

```
 6  def print_rectangle(user_char):
 7
 8          for i in range(10):
 9              print(user_char*50)
10
11  user_char = input("what char? ")
12  print_rectangle(user_char)
```

```
 6  def print_rectangle():
 7      user_char = input("what char? ")
 8      for i in range(10):
 9          print(user_char*50)
10
11
12  print_rectangle()
```
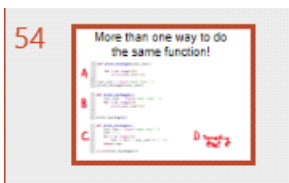
```
 6  def print_rectangle():
 7      user_char = input("what char? ")
 8      rect = ""
 9      for i in range(10):
10          rect = rect + user_char*50 + "\n"
11      return rect
12
13  print(print_rectangle())
```

ABcD what did your code look the most like?

54 More than one way to do the same function!

There are pros and cons to each version! We'll discuss why you'd do one over the other, but some comes down to style. Coding has a lot of

down to style. Coding has a lot of creativity! More than one way to solve the same problem

More than one way to do the same function!

A
```
 6  def print_rectangle(user_char):
 7
 8      for i in range(10):
 9          print(user_char*50)
10
11  user_char = input("what char? ")
12  print_rectangle(user_char)
```

B
```
 6  def print_rectangle():
 7      user_char = input("what char? ")
 8      for i in range(10):
 9          print(user_char*50)
10
11
12  print_rectangle()
```

C
```
 6  def print_rectangle():
 7      user_char = input("what char? ")
 8      rect = ""
 9      for i in range(10):
10          rect = rect + user_char*50 + "\n"
11      return rect
12
13  print(print_rectangle())
```

D Something else?

Functions 2

Functions

(L-14-1)

```
def hello():
    print("hello!")
```

input → [   ] → Return value

Most functions we've used so far
we only knew the input : return value

Let's build some!

Goal: a function that will repeat hello
with the number set by a parameter

```
def hello_num(x):
    for i in range(x):
        print("hello!")
```

What does this do?

X is terrible name

What is this called

argument → parameter
hello_num(5)   X

rewrite so you specify word! number
2 min think   madtea party : all post to chat at
once

```
def echo (x, words):
    for i in range(x):
        print(words)
```

Multiple parameters are
comma separated

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Turtle review

(Some vocab)

import turtle   ← module

tex = turtle.Turtle()

↑

caps is convention
for Constructor

tex. forward (100)

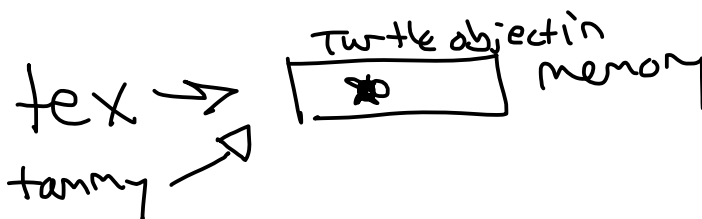↑ object functions are methods

use dot notation to ask tex

to use its methods

tal = turtle.Turtle()

tammy = tex   what does this do?

```
1    import turtle
2    tex = turtle.Turtle()
3    tammy = tex
4
5    tex.forward(100)
6    tammy.color("red")
7    tammy.forward(100)
```

repl.it

tex →

tammy →

Turtle object in
memory

thonny

Thonny

Name	Value
tammy	\<turtle.Turtle object at 0x03FAA5D0\>
tex	\<turtle.Turtle object at 0x03FAA5D0\>

Turtle walking

```
1  #1 turtle wander around in 10 different directions
2
3  #1 import what we need (random, turtle)
4
5  #1 make a turtle
6
7      #2 for loop going 10 times
8  #1 point the turtle in a random direction
9
10 #1 have the turtle walk a random distance
```

breakout rooms 3 min

```
1  #turtle wander around in 10 different directions
2
3  #import what we need (random, turtle)
4  import turtle
5  import random
6
7  #make a turtle
8  trixie = turtle.Turtle()
9
10 #for loop going 10 times
11 for i in range(10):
12     #point the turtle in a random direction
13     trixie.right(random.randint(0,359))
14     #have the turtle walk a random distance
15     trixie.forward(random.randint(10,150))
```