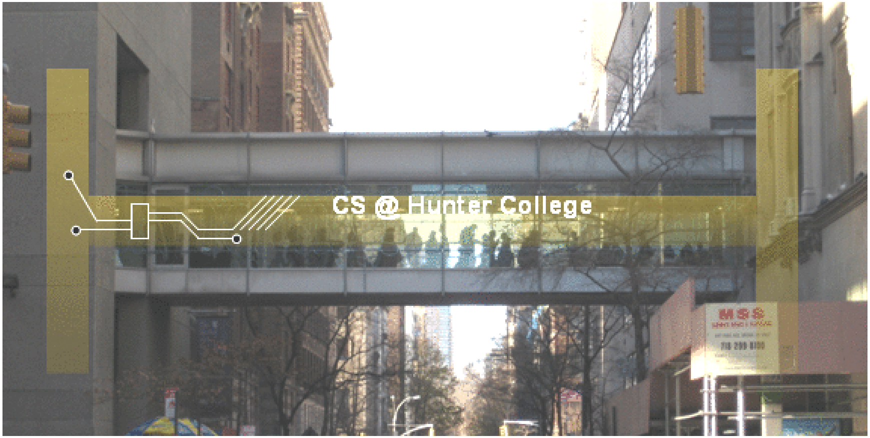
CSci 127: Introduction to Computer Science



hunter.cuny.edu/csci

Announcements

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- Spring Break:
  Friday, 30 March to Sunday, 8 April.
- Each lecture includes a survey of computing research and tech in NYC.

  Today: Anna Whitney (Google).

Frequently Asked Questions

From lecture slips & recitation sections.

- How can I prepare for the paper quizzes (and the final)?
  Starting this week, we'll end with quiz & final practice questions. No new material– focus on problem solving.
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  - *Always good to aim a bit higher!*

Today's Topics

- Functions
- Github
- Anna Whitney (Google) & Design Challenge
- Final Exam Overview

Functions

- Functions are a way to break code into pieces, that can be easily reused.

```
#Name:  your name here
#Date:  October 2017
#This program, uses functions,
#     says hello to the world!

def main():
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- Many languages require that all code must be organized with functions.

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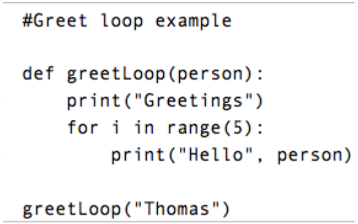
- You **call** or **invoke** a function by typing its name, followed by any input parameters, surrounded by parenthesis:
  Example: `print("Hello", "World")`
- Can write, or **define** your own functions, which are stored, until invoked or called.

In Pairs or Triples:

Predict what the code will do:



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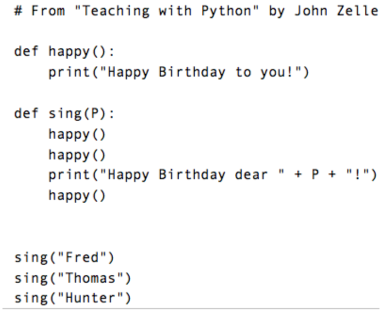
#Greet loop example

def greetLoop(person):
    print("Greetings")
    for i in range(5):
        print("Hello", person)

greetLoop("Thomas")
```



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# From "Teaching with Python" by John Zelle

def happy():
    print("Happy Birthday to you!")

def sing(P):
    happy()
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    print("Happy Birthday dear " + P + "!")
    happy()


sing("Fred")
sing("Thomas")
sing("Hunter")
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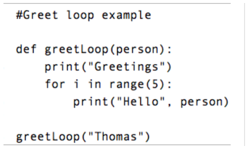
Python Tutor



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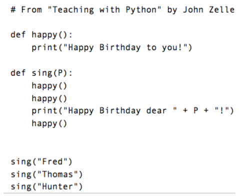

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(Demo with `pythonTutor`)

Input Parameters & Return Values

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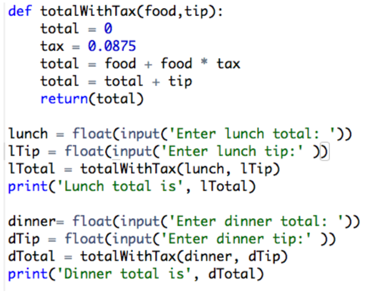

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    total = 0
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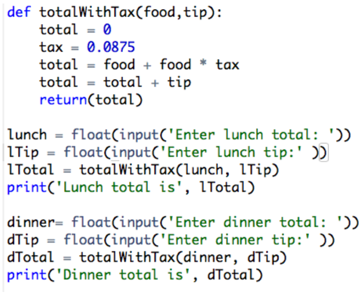

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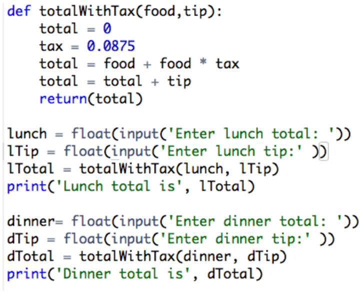

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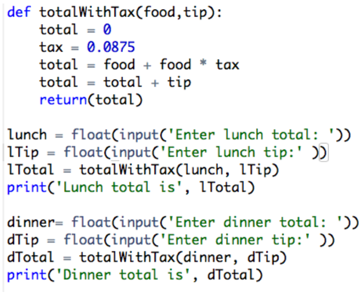

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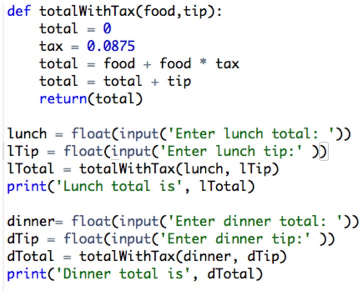

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- Functions can also **return values** to where it was called.

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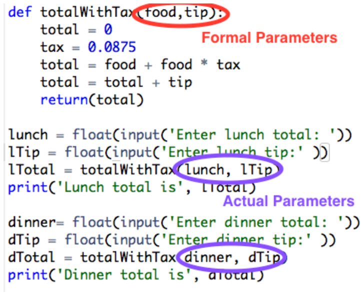

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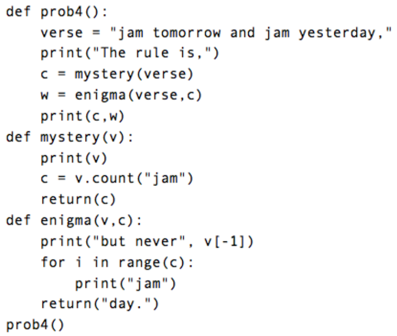

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    c = mystery(verse)
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def mystery(v):
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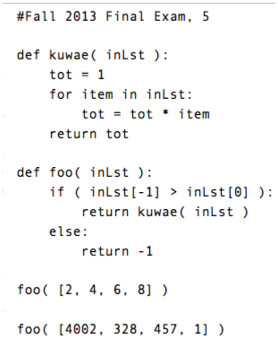

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#Fall 2013 Final Exam, 5

def kuwae( inLst ):
    tot = 1
    for item in inLst:
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    return tot

def foo( inLst ):
    if ( inLst[-1] > inLst[0] ):
        return kuwae( inLst )
    else:
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foo( [2, 4, 6, 8] )

foo( [4002, 328, 457, 1] )
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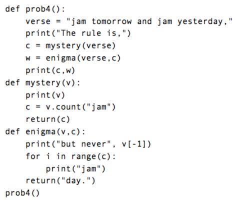
Python Tutor



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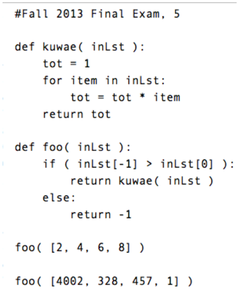

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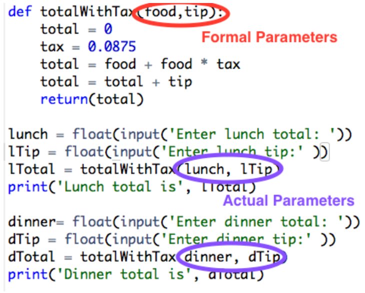

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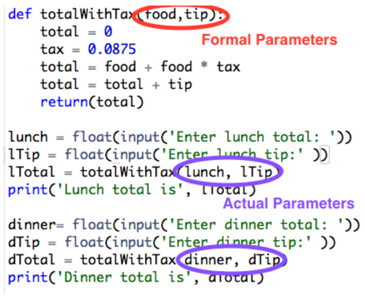

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- All the commands inside the function are performed on the copies.

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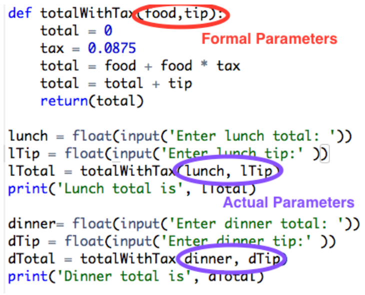

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    total = total + tip
    return(total)

lunch = float(input('Enter lunch total: '))
lTip = float(input('Enter lunch tip:' ))
lTotal = totalWithTax(lunch, lTip)
print('Lunch total is', lTotal)

dinner= float(input('Enter dinner total: '))
dTip = float(input('Enter dinner tip:' ))
dTotal = totalWithTax(dinner, dTip)
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```

- When called, the actual parameter values are copied to the formal parameters.
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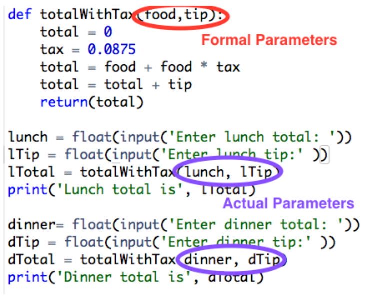
Input Parameters



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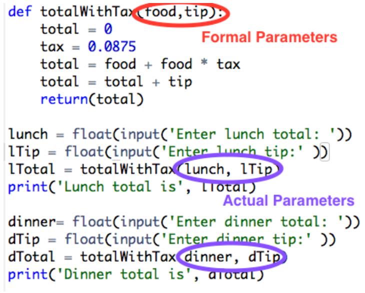

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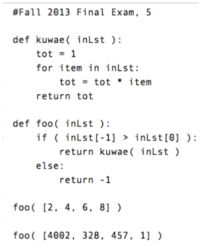
- The copies are discarded when the function is done.
- The time a variable exists is called its **scope**.

Input Parameters: What about Lists?



```
#Fall 2013 Final Exam, 5

def kuwae( inLst ):
    tot = 1
    for item in inLst:
        tot = tot * item
    return tot

def foo( inLst ):
    if ( inLst[-1] > inLst[0] ):
        return kuwae( inLst )
    else:
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foo( [2, 4, 6, 8] )

foo( [4002, 328, 457, 1] )
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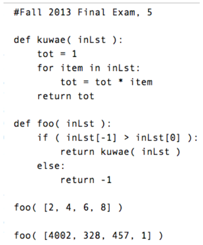

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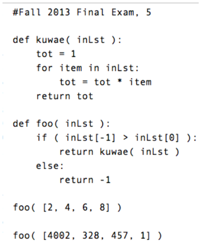

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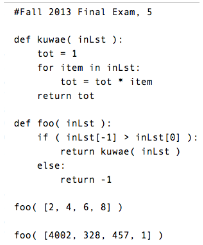

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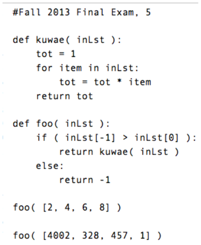

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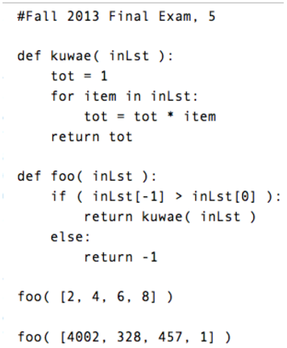
- The actual parameters do not change, but the inside elements might.
- Easier to see with a demo.

Python Tutor



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(Demo with `pythonTutor`)

In Pairs or Triples:

```
def bar(n):
    if n <= 8:
        return 1
    else:
        return 0

def foo(l):
    n = bar(l[-1])
    return l[n]
```

- What are the formal parameters for the functions?
- What is the output of:

  ```
  r = foo([1,2,3,4])
  print("Return:  ", r)
  ```

- What is the output of:

  ```
  r = foo([1024,512,256,128])
  print("Return:  ", r)
  ```

Python Tutor

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def bar(n):
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        return 1
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In Pairs or Triples:

```
def prob4(amy, beth):
     if amy > 4:
          print("Easy case")
          kate = -1
     else:
          print("Complex case")
          kate = helper(amy,beth)
     return(kate)
```

```
def helper(meg,jo):
     s = ""
     for j in range(meg):
          print(j, ": ", jo[j])
          if j % 2 == 0:
               s = s + jo[j]
               print("Building s:", s)
     return(s)
```

- What are the formal parameters for the functions?
- What is the output of:

```
r = prob4(4,"city")
print("Return:  ", r)
```

- What is the output of:

```
r = prob4(2,"university")
print("Return:  ", r)
```

Python Tutor

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Github

Octocat

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- Also convenient place to host websites (i.e. `stjohn.github.io`).

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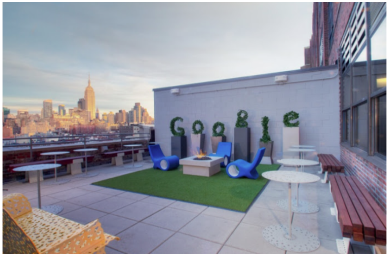
- Github provides hosting for repositories (**'repos'**) of code.
- Also convenient place to host websites (i.e. `stjohn.github.io`).
- In lab, we will set up github accounts and copy (**'clone'**) documents from the class repo. (More in future courses.)

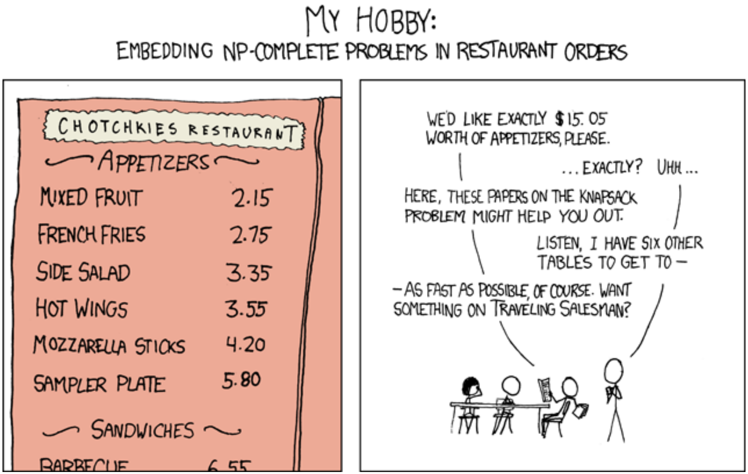
CS Survey Talk



careers.google.com

Anna Whitney
(Google)

Design Challenge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CHOTCHKIES RESTAURANT
APPETIZERS
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FRENCH FRIES 2.75
SIDE SALAD 3.35
HOT WINGS 3.55
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SAMPLER PLATE 5.80
SANDWICHES
BARBECUE 6.55
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...EXACTLY? UHH...
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LISTEN, I HAVE SIX OTHER TABLES TO GET TO –
– AS FAST AS POSSIBLE, OF COURSE. WANT SOMETHING ON TRAVELING SALESMAN?

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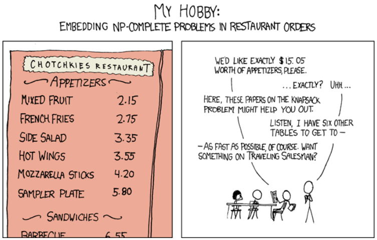
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- Possible solutions:

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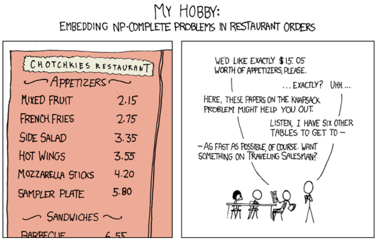
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- Possible solutions:
  - 7 orders of mixed fruit, or

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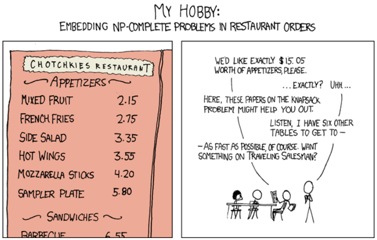
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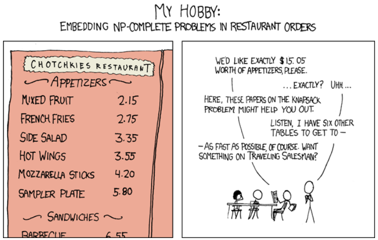
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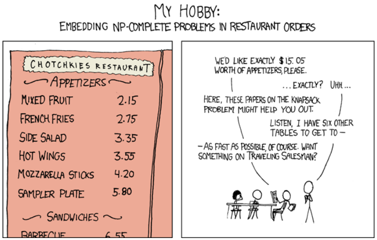
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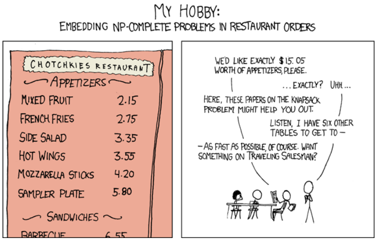
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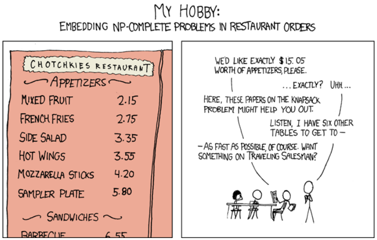
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- "NP-Complete" problem: possible answers can be checked quickly, but not known how to compute quickly.

Recap

- On lecture slip, write down a topic you wish we had spent more time (and why).

```
#Name:  your name here
#Date:  October 2017
#This program, uses functions,
#     says hello to the world!

def main():
     print("Hello, World!")

if __name__ == "__main__":
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- Can write, or **define** your own functions, which are stored, until invoked or called.
- Functions can have **input parameters** that bring information into the function,
- And **return values** that send information back.

Recap

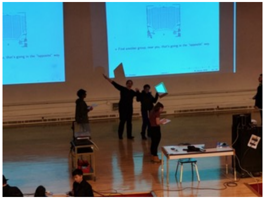
```
#Name:  your name here
#Date:  October 2017
#This program, uses functions,
#     says hello to the world!

def main():
     print("Hello, World!")

if __name__ == "__main__":
     main()
```

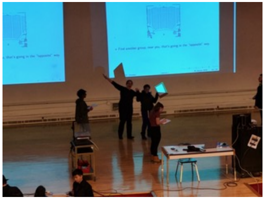
- On lecture slip, write down a topic you wish we had spent more time (and why).
- Functions are a way to break code into pieces, that can be easily reused.
- You **call** or **invoke** a function by typing its name, followed by any inputs, surrounded by parenthesis:
  Example: `print("Hello", "World")`
- Can write, or **define** your own functions, which are stored, until invoked or called.
- Functions can have **input parameters** that bring information into the function,
- And **return values** that send information back.
- Both input parameters and return values are optional.

Practice Quiz & Final Questions



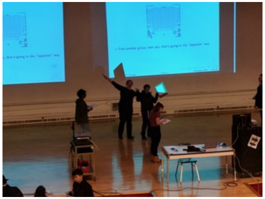
- Lightning rounds:

Practice Quiz & Final Questions



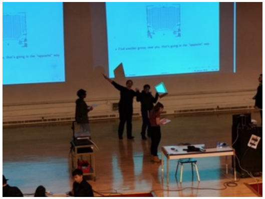
- Lightning rounds:
  - write as much you can for 60 seconds;

Practice Quiz & Final Questions



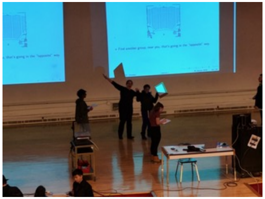
- Lightning rounds:
  - write as much you can for 60 seconds;
  - followed by answer; and

Practice Quiz & Final Questions



- Lightning rounds:
    - write as much you can for 60 seconds;
    - followed by answer; and
    - repeat.

Practice Quiz & Final Questions



- Lightning rounds:
  - write as much you can for 60 seconds;
  - followed by answer; and
  - repeat.
- Hope to cover first half of the mock exam (on web page).