

CS21: INTRODUCTION TO COMPUTER SCIENCE

Prof. Mathieson

Fall 2018

Swarthmore College

Informal quiz: discuss with a new partner

Code draft from Student X: `mystery_error.py`

```
def mystery(lst):  
    s = 0  
    for i in range(10):  
        s = s + lst(i)  
    print(s)  
  
def main():  
    my_lst = [8, 3, 7, 2, 4, 9, 1, 19, 2, 17]  
  
    mystery(my_lst)  
    print("result1 is:", s)  
    print("result2 is:", s/len(my_lst))  
  
main()
```

- 1) What is Student X trying to do?
- 2) What errors do you notice in this program?
- 3) What style modifications would you make?

Outline Sept 26:

- Hand back Quiz 1
- Continue Functions (go over **factorial.py**)
- Scope and program execution
- Stack diagrams
- Multi-function example: **first_last.py**

Notes

- **Lab 3** due **Saturday** night
- Ninja session tonight! 7-10pm
- **Office hours Friday 3-5pm**

Continue Functions

factorial.py example solution

```
"""
Practice with functions. Write a function that takes one argument, a
non-negative integer n, and returns n! = n*(n-1)*(n-2)....3*2*1. Note: 0! = 1

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"""

def factorial(n):
    """
    Given a non-negative integer n, return n! = n*(n-1)*(n-2)....3*2*1.
    """
    fact = 1 # set up an accumulator variable
    for i in range(n):
        fact = fact * (i+1) # accumulator pattern
    return fact

def main():
    """
    In the main function, test the factorial function.
    """
    # test on 100 different numbers
    for n_test in range(100):

        # call/invoke the factorial function
        result = factorial(n_test)

        # print the result
        print("%i! = %i" % (n_test, result))

main()
```

Scope and program execution

[What are shared sessions?](#)

Python 3.6

```
1 def factorial(n):
2     fac = 1 # set up an accumulator variable
3     for i in range(n):
4         fac = fac * (i+1) # accumulator pattern
5     return fac
6
7
8 def main():
9
10    for n_test in range(10):
11        # call the factorial function
12        result = factorial(n_test)
13
14        # print the result
15        print("%d! = %d" % (n_test, result))
16
17    main()
```

[Edit code](#) | [Live programming](#)

→ line that has just executed

→ next line to execute

Print output (drag lower right corner to resize)

```
0! = 1
1! = 1
2! = 2
3! = 6
4! = 24
5! = 120
```

Frames

Objects

Global frame

factorial

main

function

factorial(n)

function

main()

main

n_test

5

result

120

pythontutor.com, stack diagrams

first

symbols

!

*

+

=

.

?

second

uppercase

A

B

:

Z

third

lowercase

a

b

:

z

1 def f(x,y):

2 $x = x + y$
3 # draw stack/heap here
4 print(x)

5 return x

6 def main():

7 n = 4

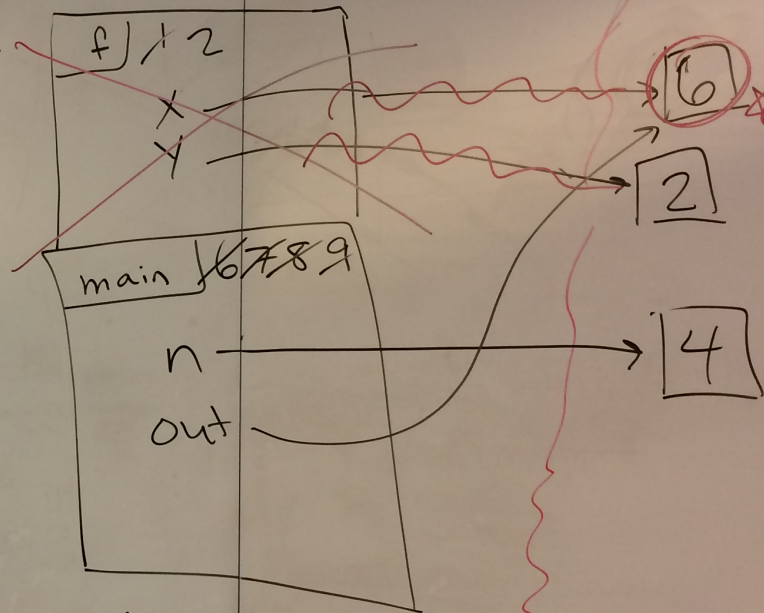
8 out = f(n, 2)

9 print(out)

10
11 main()

function stack

heap (values)



output

6

6

Program for today

- [cs21/inclass/week04/first_last.py](#)
- Work with a partner
- Write the functions in order, testing each one
- No need to change main! Only to uncomment test cases