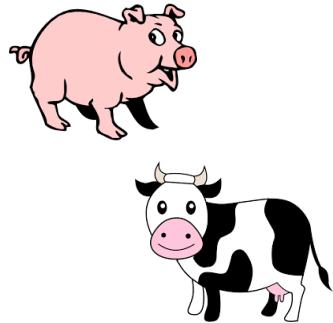


CompSci 101

Introduction to Computer Science



Sept 8, 2016

Prof. Rodger
(lecture by Barrett Ames)

compsci 101, fall 2016

1

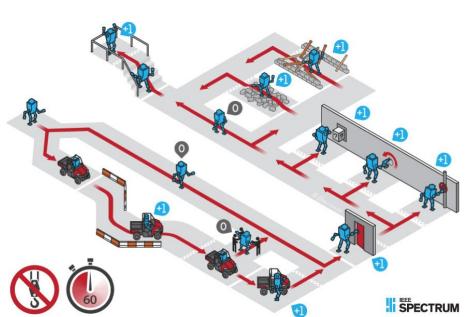
Whose this guy?



compsci 101, fall 2016

2

What do I do?



compsci 101, fall 2016



3

Announcements

- Reading and RQ4 due next time
- Asgn 2 out, APT 1 is due Tuesday
- Lab 2 this week
- To add class or change sections – see:
 - www.cs.duke.edu/courses/compsci101/fall16
- Today
 - more APT practice
 - functions, parameters
 - Names, types and values

compsci 101, fall 2016

4

Python Functions

- Answer these questions based on thinking, don't run any code
 - <http://bit.ly/101f16-0906-3>
- Why do we need functions?
 - Manage complexity of large programs
 - Test and develop code independently
 - Reuse code in new contexts: create APIs!

Functions return values

- Most functions return values
 - Sometimes used to make things simpler, but returning values is a good idea

```
def inch2centi(inches):  
    return 2.54*inches  
  
xh = inch2centi(72)
```

```
def pluralize(word):  
    return word + "es"  
  
pf = pluralize("fish")
```

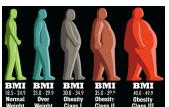
compsci 101, fall 2016

6

What is an APT? [BMI APT](#)

- Automated/Algorithmic Problem Testing
 - Write one function, 2-30 lines, solve a problem
 - Tested automagically in Eclipse or the browser
 - Lots of test cases – test test test
- Start simple, build toward more complex
 - What is a function? A function call?
 - What is a parameter? Argument?
 - How do you run/execute a program

compsci 101, fall 2016



Demo Solving APT BMI

- Write your code in Eclipse
 - Create python file
 - Name of file important – case matters
 - name of function important – cut and paste this
 - Write your code
 - Test a few examples in Eclipse
- Run online on using APT Tester
 - Tests on lots of examples, Debug, fix
 - Get all GREEN – Green dance!
- Submit on APT page
 - README form too

compsci 101, fall 2016

8

Function Detective

- <http://bit.ly/101sp16-0126-1>

Results of Code Analysis

- For details on plurals: <http://bit.ly/1N49u6b>
- How did we call `pluralize` many times?
 - Loop. What is an alternative?
- What does the 'if' statement do?
 - Selects a code block to execute (more next week)
- If you have a question? Write and run code!

compsci 101, fall 2016

9

compsci 101, fall 2016

Organization matters

- <https://www.youtube.com/watch?v=1ve57l3c19g>



compsci 101, fall 2016

11

APT organization, Code organization

- You've written the `BMI.py` APT
 - Where is that module? How do you test it?
 - PyDev console, but then must import it
 - Adding print statements in `BMI.py` to test
- Putting sentences together in order...
 - "Once upon a time..." "It was the best of times..." "Aujord'hui ma maman est morte"
- Putting code together in order
 - Takes judgment and experience

compsci 101, fall 2016

12

Python – Names and Types

- Names vs abstractions
 - What is <http://152.3.140.1>
 - What is <http://www.amazon.com>
- Types are important
 - What is foo.pdf, foo.mp4, foo.jpg, foo.wav
 - Do the file extensions guarantee file type?
- Python – what types are these?

```
first = "Susan"  
x = 6  
y = 3.4
```

compsci 101, fall 2016

13

Strings

- Sequence of characters in quotes

```
"I" + 'Love' + '''Python'''  
"I" 'Love' '''Python'''
```

- String operators: concatenation (+), repeat(*)

- Precedence?

```
"a" + "b" + "c" * 3
```

'abcbcbc'

compsci 101, fall 2016

14

Strings

- Sequence of characters in quotes (same result)

```
"I" + 'Love' + '''Python'''  
"I" 'Love' '''Python'''  
'ILovePython'
```
- String operators: concatenation (+), repeat(*)
- Precedence?

```
"a" + "b" + "c" * 3  
'abccc'
```
- Precedence?

```
"a" + "b" "c" * 3  
'abcbcbc'
```

compsci 101, fall 2016

15

Function

- def functionName(parameters):
 block of code

- **Parameters** – placeholder, will store value passed in
- **Arguments** – values in the call, that you pass to the function to use as input

compsci 101, fall 2016

16

Function – return or print?

- Example function that returns a value

```
def sum(a, b):  
    return a+b
```

- Example function that prints

```
def hw(name):  
    print "Hello " + name
```

- Call Functions

```
print sum(4,7)  
answer = sum(4,7)  
hw("Sue")
```

compsci 101, fall 2016

```
sum(4,7)  
print hw("a")
```

17

Function – return or print?

- Example function that returns a value

```
def sum(a, b):  
    return a+b
```

- Example function that prints

```
def hw(name):  
    print "Hello " + name
```

- Call Functions

```
print sum(4,7)  
answer = sum(4,7)  
hw("Sue")
```

compsci 101, fall 2016

sum(4,7)
print hw("a")

18

Old MacDonald Song



Old MacDonald had a farm, E-I-E-I-O
And on his farm he had a pig, E-I-E-I-O
With a Oink Oink here, and a Oink Oink there
Here a Oink, there a Oink everywhere a Oink Oink
Old MacDonald had a farm E-I-E-I-O



Old MacDonald had a farm, E-I-E-I-O
And on his farm he had a cow, E-I-E-I-O
With a Moo Moo here, and a Moo Moo there
Here a Moo, there a Moo everywhere a Moo Moo
Old MacDonald had a farm E-I-E-I-O

- Write a Program to print this song

compsci 101, fall 2016

19



Function OldMacPig()

```
def OldMacPig():  
    print "Old MacDonald had a farm,",  
    print "E-I-E-I-O"  
    print "And on his farm he had a pig,",  
    print "E-I-E-I-O"  
    print "With a Oink Oink here,",  
    print "and a Oink Oink there"  
    print "Here a Oink, there a Oink",  
    print "everywhere a Oink Oink"  
    print "Old MacDonald had a farm",  
    print "E-I-E-I-O"
```

compsci 101, fall 2016

20

Rest of Code

- Function OldMacCow

- Replace “pig” with “cow”
 - Replace “Oink” with “Moo”

- Code to start:

```
if __name__ == '__main__':
    OldMacPig()
    print
    OldMacCow()
```

compsci 101, fall 2016



21

Discuss how to make code better
bit.ly/101sp16-0126-1a

- Describe in words how you can make the code better? More efficient?
 - Fewer lines of code?
 - Use more functions?
 - Discuss your changes.
- What advantages do the changes you make have?

compsci 101, fall 2016

22

Demo – Old Mac improvements

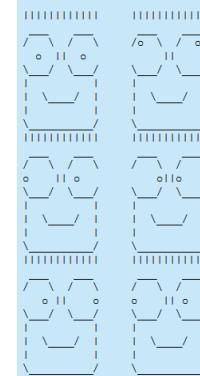
- What does the horse say?
- What does the cow say?
- What does the fox say?

compsci 101, fall 2016

23

Assignment 2 out

- Totem poles
 - printing heads
 - functions



compsci 101, fall 2016

24

Names, Types and Values

- bit.ly/101sp16-0126-2