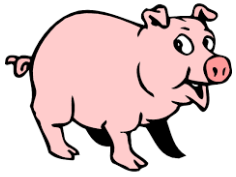
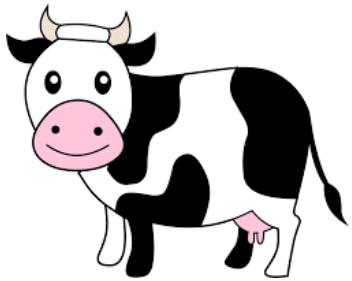
CompSci 101
Introduction to Computer Science





APT: CompSci 101, Fall 2017, APT

This is the testing page. Once your program works here, you need to run your APT on the submit page (back on the previous page).

Problem Set 1	Details
First APTs are due on Tues. Sept 12 at 11:59pm, do them all! If we do any in lecture or lab, you still have to do them and turn them in.	
○ Gravity	do in lab 2
○ Bogsquare	easiest, do first
○ Cone	
○ Grayscale	
○ BMI	do together in class on 9/5

Sep 5, 2017

Prof. Rodger

Announcements

- Reading and RQ3 due next class
- Assignment 1 due today!
  - See the catch up schedule – for everyone!
- APT 1 out and due on Tuesday, Sep 12
- Need a pin to add class – fill out form
- Exam accommodations – fill out form
- Lab 2 this week

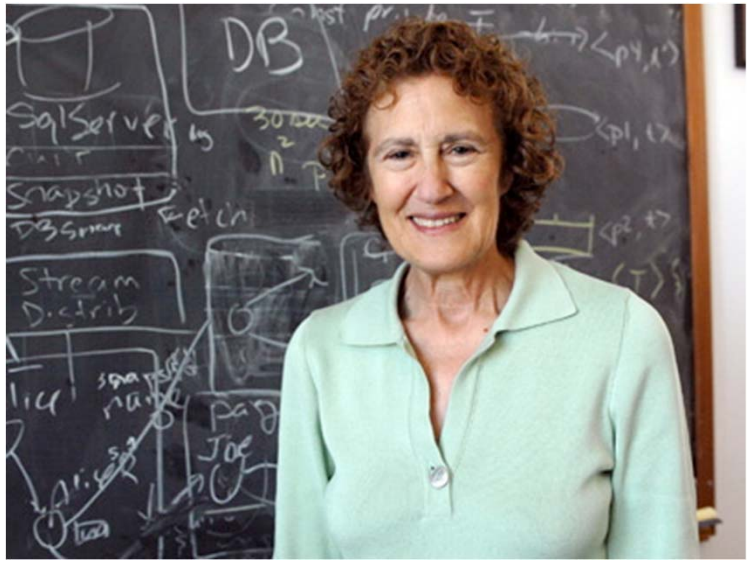
- Today –Variables and Functions, Solve an APT, Problem solving

The Online Textbook

- Text part describes Python Version 3
- My version of the book, Python Version 2 just in the code boxes
- Main Differences:
  - Divide, not using //
    - Use / for division, 7/2 will be 3
    - 7.0/2 will be 3.5
  - Print
    - We will use: print x
    - Not using with parenthesis: print(x)

Barbara Liskov

- (one of) first women to earn PhD from compsci dept
  - Stanford 1968
- Turing award in 2008
  - Programming Languages
  - CLU



"It's much better to go for the thing that's exciting. But the question of how you know what's worth working on and what's not separates someone who's going to be really good at research and someone who's not. There's no prescription. It comes from your own intuition and judgment."

Starting with Python

- Variable
  - Name of a storage location – holds a value
  - = to assign a value to a variable
- Type
  - Different types of data
  - A variable can store data of a certain type
  - int, float, str
- operators in Python for numbers
  - Arithmetic: `+ - * / % **`
- Built-in functions: pow, abs, round, int, float

  `example: pow(2,3) + round (1.6)`

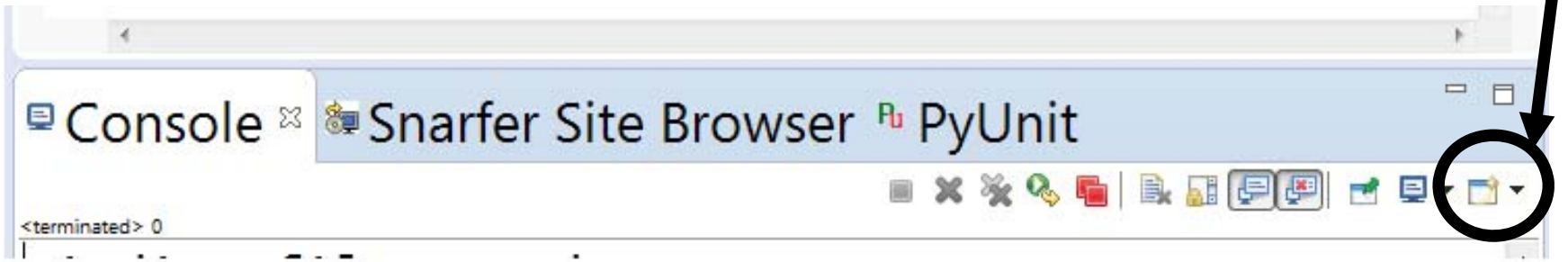
Starting with Python
http://bit.ly/101f17-0905-1

Eclipse – Three ways to run

1. Write program and store in file
   - Create a PyDev project – a folder for programs
   - Create a PyDev module for each program (file)
   - Run in console
2. Create an APT in Eclipse and run on web
3. Run interactively
   - Open PyDev console
   - Execute each line as typed
   - Code not saved

Demo: Run interactively in Eclipse PyDev Console

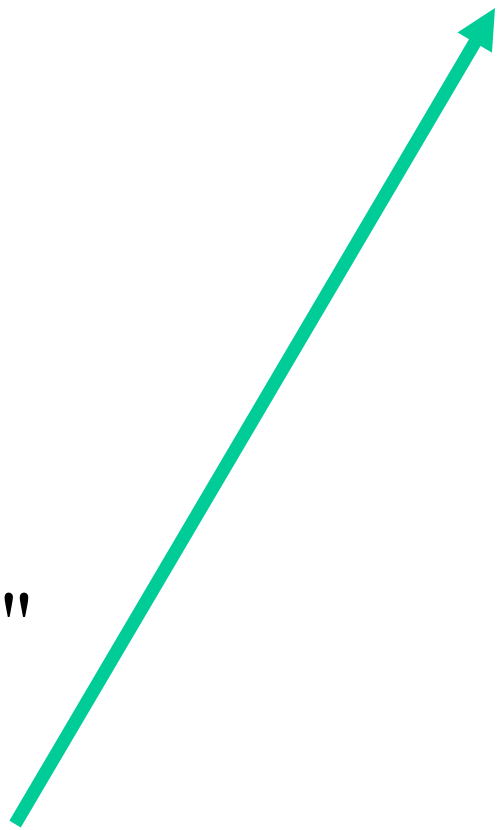
- If Console window is not showing then
  - Click on Window, Show View, Console
- Then at the bottom of Eclipse, click here:



- Select PyDev Console, Python Console

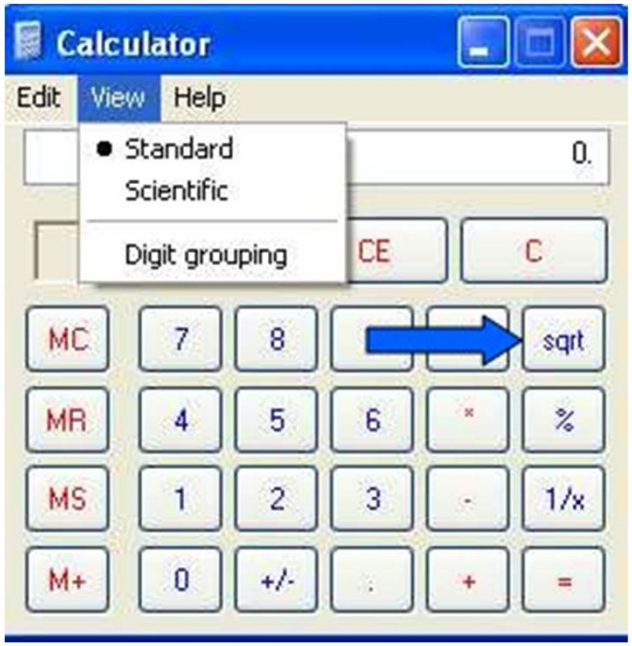
Variables, Types, Expressions?

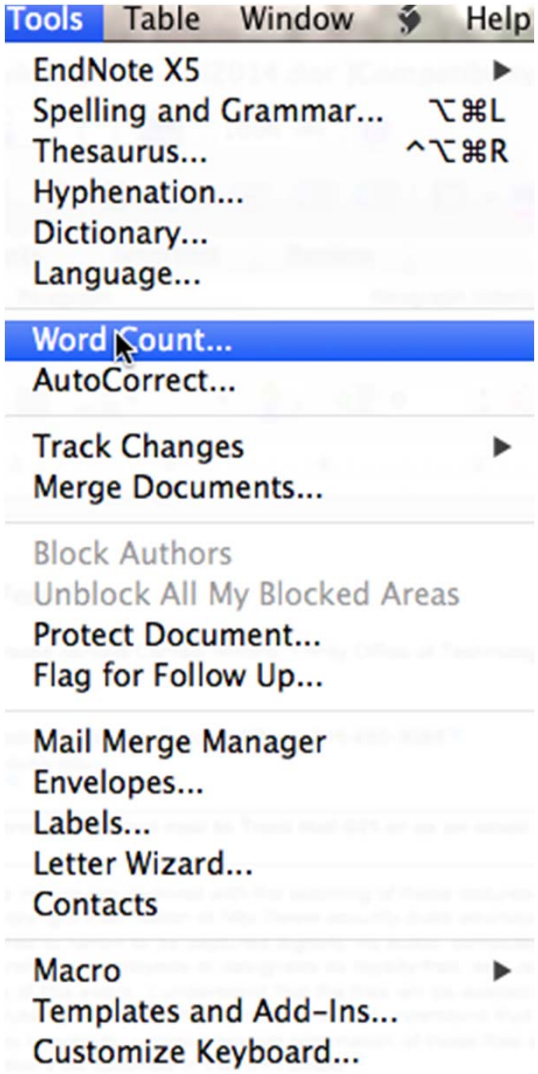
```
a = 5
b = 4
print b
a = a + b
print a
c = "fred"
print c
```



```
print a + b * 3
print (a + b) * 3
print a / b
print a / (b * 1.0)
```

Examples of functions





Functions explained

- In a calculator, sqrt: number in -> number out
  - What is domain, what is range?
- In MSWord, word count: document -> number
  - Domain is word doc, range is integer
- In browser, web: URL -> HTML formatted "page"
  - Domain is valid URL, range is HTML resources
- In Python we see similar structure!

Function

- def functionName(parameters):

  block of code

- Parameters – place holder, will store value passed in
- Arguments – values in the call, that you pass to the function to use as input
- Body of function must be indented

Demo

- In Eclipse write a file with a function and run it
- stuff.py

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

if __name__ == '__main__':
    print sum(3,5)
    print sum(1,4)
```

APTs

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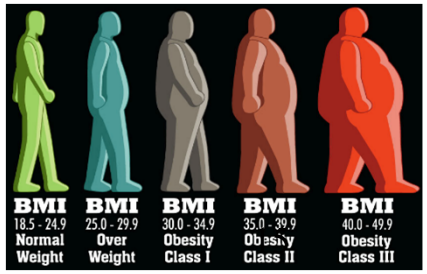
○ BMI	do together in class on 9/5

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



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
- Submit on APT page
  - REFLECT form too

APT: BMI

Problem Statement

See Wikipedia for information about *body mass index* or BMI and how to calculate it using the formula

$$BMI = 703.0695 * weight/(height^2)$$

Write function `calculate` that returns the BMI of a person whose weight and height, in pounds and inches respectively, are parameters to the function `calculate`.

Specification

filename: BMI.py

```
def calculate(weight,height):
    """
    return float indicating BMI
    (body mass index)
    given weight in pounds (float)
    given height in inches (float)
    """

    # you write code here
```

APT: BMI (cont)

Constraints

- `weight` will be greater than zero
- `height` will be greater than zero

Examples

1.
```
weight = 200
height = 60

returns 39.059
```

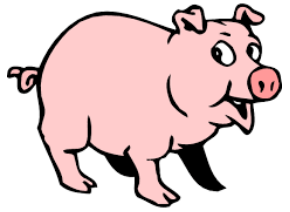
2.
```
weight = 170
height = 72

returns 23.056
```

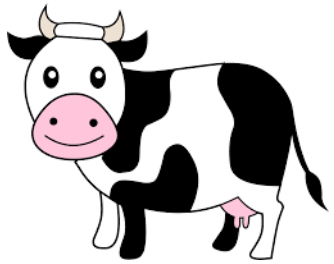
3.
```
weight = 53
height = 250

returns 62.573
```

Write a program to print the Old MacDonald Song

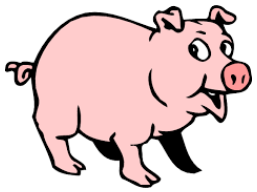


```
Old MacDonald had a farm, E-I-E-I-O
And on his farm he had a pig, E-I-E-I-O
With a Oink Oink here, and a Oink Oink there
Here a Oink, there a Oink everywhere a Oink Oink
Old MacDonald had a farm E-I-E-I-O
```



```
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
```

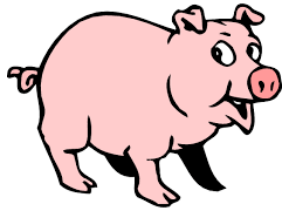
- Write a Program to print this song



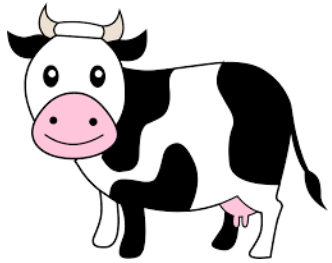
Function OldMacPig()

```
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"
```

Rest of Code



- Function OldMacCow
  - Replace “pig” with “cow”
  - Replace “Oink” with “Moo”
- Code to start:



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

Discuss how to make code better bit.ly/101f17-0905-2

- 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?

Lab 2 this week

- Write a program to print a song
- Work on the Gravity APT

APT: Gravity

Problem Statement

Elphaba has decided to try to defy gravity. She's going to drop or throw an object from the top of an infinitely tall building and see how far it falls. She knows exactly what speed she throws the object and has a stop watch she uses to time how long it falls.

Write function `falling` that returns the

Specification

```
filename: Gravity.py

def falling(time,velo):
    """
    return float indicating
    number of meters an object has
    fallen after being dropped/thrown
    with initial velocity given by
    float parameter velo
```