Welcome Back to CS 5 Black!

PENGUIN GETS $1B IN FUNDING

San Jose (AFP): A penguin who was chased out of a Harvey Mudd College computer science lab by an angry mob has turned the experience into a startup with a billion dollars in venture funding. The new company will market an app that helps penguins track and dodge predators. “The market is huge,” said one investor. “Antarctica is full of penguins and they don’t have any way to know where the sharks are. We expect massive returns.”

The founding penguin will celebrate in a local sushi restaurant.

Please pick up these lecture notes!
Defining Your Own Functions!

```python
def dbl(x):
    return 2 * x
```

```python
def dbl(myArgument):
    myResult = 2 * myArgument
    return myResult
```

Notice the indentation. This is done using "tab" and it's absolutely necessary!

Docstrings!

```python
def dbl(x):
    """This function takes a number x and returns 2 * x""
    return 2 * x
```

This is sort of like teaching your programs to talk to you!

Docstrings…and Comments

```python
# Doubling program
# Author: Ran Libeskind-Hadas
# Date: August 27, 2011

def dbl(x):
    """This function takes a number x and returns 2 * x""
    return 2 * x
```

Composition of Functions

```python
def quad(x):
    return 4 * x
```

```python
def quad(x):
    return dbl(dbl(x))
```

Doubly cool!
Multiple Arguments...

```python
# myFunc
# Author: Ran Libeskind-Hadas
# Date: August 27, 2011

def myFunc(x, y):
    return x + 42 * y
```

That's a kind of a funky function!

Mapping with Python...

```python
def dbl(x):
    return 2 * x

>>> list(map(dbl, [0, 1, 2, 3, 4]))
[0, 2, 4, 6, 8]

def evens(n):
    myList = range(n)
    doubled = list(map(dbl, myList))
    return doubled

Alternatively....

def evens(n):
    return list(map(dbl, range(n)))
```

Stretch Break!

The scent of coffee appears to boost performance in math
Smelling a coffee-like scent, which has no caffeine in it, creates an expectation for students that they will perform better on tests

Date: July 17, 2018
Source: Stevens Institute of Technology
Summary: Research reveals that the scent of coffee alone may help people perform better on the analytical portion of the Graduate Management Aptitude Test, or GMAT, a computer adaptive test required by many business schools.


reduce-ing with Python...

```python
from functools import reduce
def add(x, y):
    return x + y

>>> reduce(add, [1, 2, 3, 4])
10
```

Prof. Dodds could have told us that!
Google’s “Secret”

This is what put Google on the map!

MapReduce: Simplified Data Processing on Large Clusters
Jeffrey Dean and Sanjay Ghemawat

Abstract
MapReduce is a programming model and an associated implementation for processing intermediate key/value pairs, and a reduce function that merges all intermediate values.

Programs written in this functional style are automatically parallelized and executed on scheduling the program’s execution across a set of machines, handling machine failure.

Try This…

Write a function called `span` that returns the difference between the maximum and minimum numbers in a list...

```python
>>> span([3, 1, 42, 7])
41
>>> span([42, 42, 42, 42])
0
```

```
min(x, y)
max(x, y) These are built into Python!
```

Try This...

1. Write a python function called `gauss` that accepts a positive integer argument N and returns the sum $1 + 2 + \ldots + N$

2. Write a python function called `sumOfSquares` that accepts a positive integer N and returns the sum $1^2 + 2^2 + 3^2 + \ldots + N^2$

You can write extra “helper” functions too!

```
def dbl(x):
    return 2 * x

def trbl(x):
    print 2 * x

def happy(input):
    y = dbl(input)
    return y + 42

def sad(input):
    y = trbl(input)
    return y + 42

def friendly(input):
    y = dbl(input)
    print(y, "is very nice!")
    return y + 42
```

Strings are in single or double quotes