Python Tutorial

ACM@UIUC SIGSPATIAL

If statements

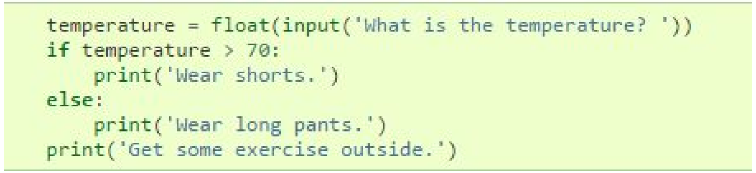
C++

```
if ( condition ) {
  // Execute these statements if TRUE
}
else {
  // Execute these statements if FALSE
}
```

Python

```
if condition:
        execute statement if condition is TRUE
else:
        execute alternative statement if FALSE
```

Example:



```python
temperature = float(input('What is the temperature? '))
if temperature > 70:
    print('Wear shorts.')
else:
    print('Wear long pants.')
print('Get some exercise outside.')
```

For loops

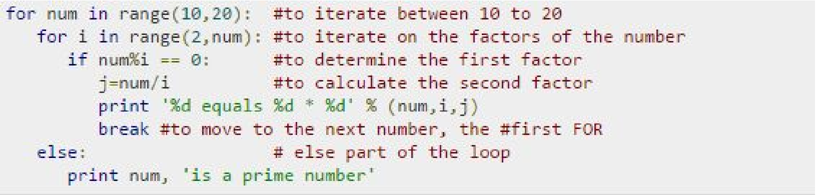
C++

for (**init; condition; increment**)
{
  statement(s);
}

Python

for **iterating_var** in **sequence**:
  statements(s)

Example:



```
for num in range(10,20):  #to iterate between 10 to 20
   for i in range(2,num): #to iterate on the factors of the number
      if num%i == 0:      #to determine the first factor
         j=num/i          #to calculate the second factor
         print '%d equals %d * %d' % (num,i,j)
         break #to move to the next number, the #first FOR
   else:                  # else part of the loop
      print num, 'is a prime number'
```

While loops

C++

```
while(condition)
{
  statement(s);
}
```

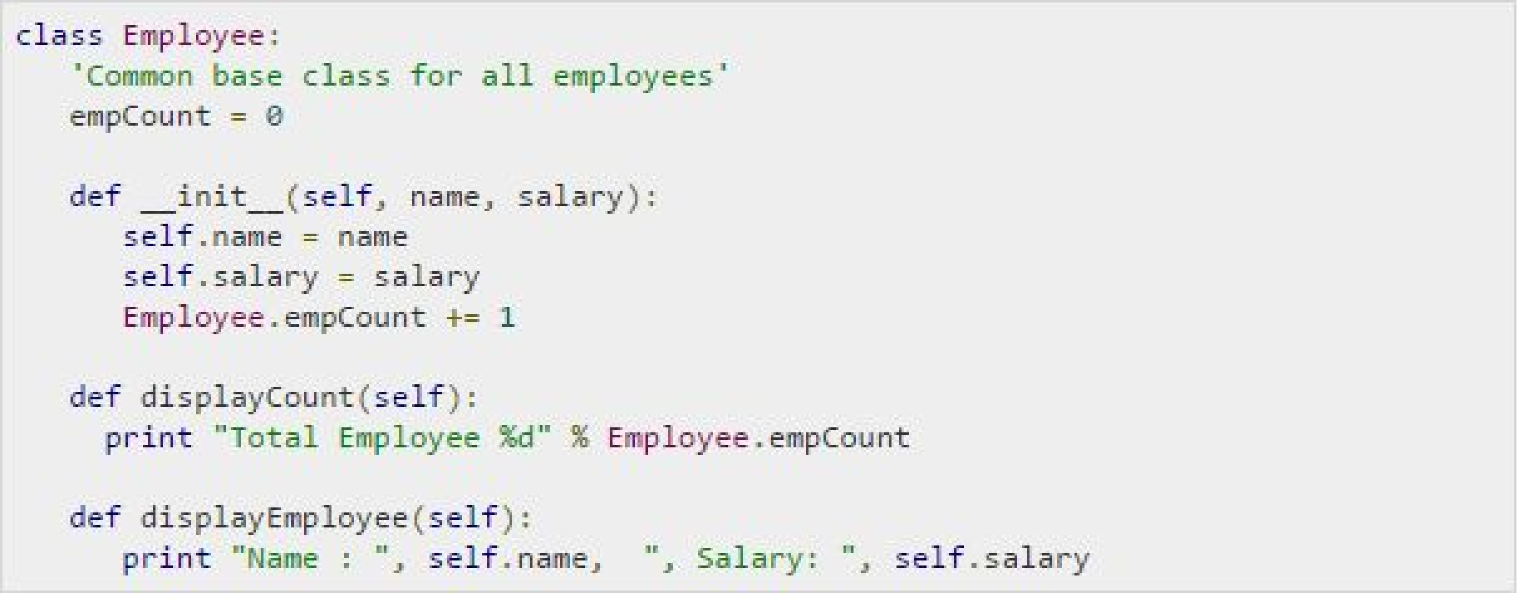
Python

```
while condition:
          statement(s)
```

Example:

```
x = 1
while True:
   print "To infinity and beyond!”
   x += 1
```

Classes & Methods



```
class Employee:
   'Common base class for all employees'
   empCount = 0

   def __init__(self, name, salary):
      self.name = name
      self.salary = salary
      Employee.empCount += 1

   def displayCount(self):
     print "Total Employee %d" % Employee.empCount

   def displayEmployee(self):
      print "Name : ", self.name,  ", Salary: ", self.salary
```

Try This! Classes

Make 2 classes: Robot and Landmark

Robot
Attributes: x, y

Landmark
Attributes: x, y

Robot Class

Answer

Landmark Class

Answer

Try This! Functions 1

Define a function ***rangescan***:

Given the inputs: A robot and a landmark

Return output: Distance between robot and landmark

Rangescan Function

Answer

Try This! Functions 2

Define a function for Robot where:

Given the inputs: vx, vy, dt

Moves the robot in the direction defined by vx, vy

Move Function

Answer

Lists

Example:

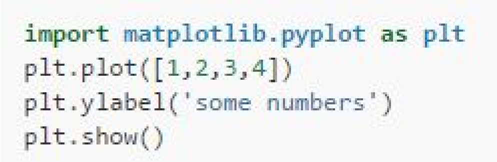
```
myList = [ item1, item2, item3, item4 ]

print myList[0]
-> item 1
print myList[2:3]
- > [item3, item4]
myList[0] = apple
Print myList[0]
- > apple
```

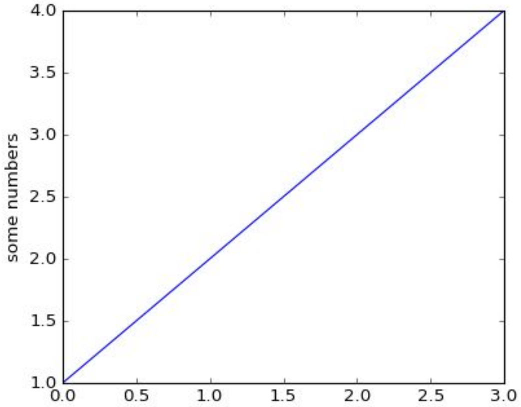
Lists continued...

```
x = [1, 2, 3]
x.append(4)
print (x)
-> [1, 2, 3, 4]
```

Matplotlib



```
import matplotlib.pyplot as plt
plt.plot([1,2,3,4])
plt.ylabel('some numbers')
plt.show()
```



Try This! Plotting

Now plot the robot’s trajectory across 10 time steps.

Hint: Use a list to record the robot’s trajectory after calling move 10x

Plotting

Answer

Try This! Lists

1. Generate 5 Landmarks between [0,0] and [20,20] randomly
2. Place them into a list of landmarks
3. Plot their locations (Mark each with a clear symbol)

Landmark Lists

Answer

Try This! Sorting Landmarks

From your array of landmarks, get distance to each and sort the array from closest to furthest with respect to the location of the robot

Sorting Landmarks Answer

Answer

FINAL EXAM

You have homework due in Siebel, ECEB, CSL, Beckman, and DCL

Since you don’t want to get out of bed, you have designed a robot to turn in your homework for you.

Given a starting point for the robot (at your apt) and 5 “landmarks”, implement a solution that will allow the robot to turn in all your homework.

Note: You don’t have to optimize for distance or time travelled (unless you want to).