

CPSC 203

Problem Solving

Week 2 Lab2

Loops and Conditions

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If-else condition

```
if test1 :  
    statements1  
elif test2:  
    statements2  
else :  
    statements3
```

Operators

- `==` equal
- `!=` not equal
- `<` less than
- `<=` less than or equal
- `>` greater than
- `>=` greater than or equal
- `and`
- `or`
- `not`

LOOPS

- If I have an array (10,20,30,40,50)
 - How to sum these numbers?

```
def myLoop():  
    Sum = 0  
    for x in [10,20,30,40,50]:  
        Sum = Sum + x  
    print Sum
```

Sum	0	10	30
x	10	20	2

Loops

for target in object (:)
statements

IMP:

Every statement indented after the loop is executed in every iteration of the loop

Example

- Modify the previous program to print the sum of each iteration in the loop

```
def myLoop():  
    Sum = 0  
    for x in [10,20,30,40,50]:  
        Sum = Sum + x  
        print "Current x:", x  
        print "Current Sum:", Sum  
    print "Finished"
```

Using range

- `range(start, end+1)` → default is `inc=1`
- `range(start, end+1, inc/dec)`

- Example 1

```
def looping2():  
    for x in range(6,16):  
        print x
```

```
6      6  
7      8  
8      10  
9      12  
10     14  
11  
12  
13  
14  
15
```

- Example 2

```
def looping3():  
    for x in range(6,16,2):  
        print x
```

While Loop

```
while condition-is-true :  
    statements
```

Example:

```
def function whileLOOP():  
    x=5  
    while x>0:  
        print x*x  
        x=x-1
```

```
x=5    → 25  
x=4    → 16  
x=3    → 9  
x=2    → 4  
x=1    → 1  
x=0    STOP
```

Try removing `x=x-1`

Notes:

- $x=x+1 \rightarrow x+=1$
- $x=x-1 \rightarrow x-=1$
- $x=x*2 \rightarrow x*=2$
- $x=x/10 \rightarrow x/=10$

More on Functions

- Define **return** value → this value will be displayed in the black box when you call the function
- Example, a function that takes two numbers and returns the largest

```
def Max(x , y):  
    if x>y :  
        return x  
  
    else  
        return y
```

Test your program with
Max(10,5)
Max(0,6)
Max(7,7)

Accepting Input from User

- Using function `raw_input('message')`

- Example:

```
def printNameID():  
    name=raw_input('What is your name?')  
    ID= raw_input('What is your ID?')  
    print name, ID
```

- The function `raw_input()` returns a string. To transfer it to integer, use the function `int()`
- Example:

```
def grades():  
    myGradeStr=raw_input('What is the grade?')  
    myGrade=int(myGradeStr)  
    if myGrade >= 90:  
        return "A"  
    else:  
        return "B"
```

Print all elements in list

```
def printList(S):
```

```
    for i in S:
```

```
        print i
```

```
    print "Length of the array is:", len(S)
```

```
    print "First element is: ", S[0]
```

```
    print "Last element is:", S[ len(S) -1]
```

Test your program with

```
printList((10,20,-10,80)
```

```
printList()
```

```
printList()
```

$\text{len}(S) = 4$

First element is 9 $S[0]$

Second element is 7 $S[1]$

Last element is 3 $S[\text{len}(S) - 1]$

S[0]	9
S[1]	7
S[2]	15
S[3]	3

```
def printList2(S):  
    if len(S)==0:  
        return "Empty"  
    for i in range(0,len(S)):  
        print "Element with index ", i, "=", S[i]
```

Define a function empty(S)

```
def empty(S):  
    return len(S) == 0
```

- Returns the result of the checking if $\text{len}(S) == 0$

Get the summation of a list

```
def sumOfList(S):  
    if empty(S):  
        return "Empty"  
    sum=0  
    for i in S:  
        sum=sum+i  
    return sum
```

Get the multiplication of a list

```
def mulOfList(S):  
    if empty(S):  
        return "Empty"  
    mul=1  
    for i in S:  
        mul= mul *i  
    return mul
```

Check for Even and odd

- Using mod function (%)
 - $5 / 2 = 2 \quad 1/2$
 - $6 / 2 = 3 \quad 0$
 - $7/2 = 3 \quad 1/2$
- $\text{EvenNumbers} \% 2 = 0$
- $\text{OddNumbers} \% 2 = 1$
- The same concept:
 - $\text{MultipliersOf3} \% 3 = 0$
 - $\text{NotMultiplierOf3} \% 3 \neq 0$
 - $\text{MultipliersOf4} \% 4 = 0$

Check a list for even and odd

```
def printEven(S):  
    if empty(S):  
        return "Empty"  
    for i in S:  
        if i%2==0:  
            print i, " is even"  
        else:  
            print i, " is odd"
```

Exercise

- Make a program to find the summation of odd elements in a list S
- Make a program to find the multiplication of elements in a list S which are multipliers of 3 and odd

Find the Min element in a list

```
def getMin(S):  
    if len(S)==0:  
        return "Empty"  
    min_so_far=S[0]  
    for i in range(1, len(S)):  
        if S[i] < min_so_far:  
            min_so_far = S[i]  
    return min_so_far
```

		Min=S[0]=9
S[0]	9	Is S[1] < min?
S[1]	7	Min=7
S[2]	15	Is S[2] < min?
S[3]	3	Min=7
		Is S[3] < min?
		Min=3

Find the Max in a list

```
def getMax(S):  
    if len(S)==0:  
        return "Empty"  
    max_so_far=S[0]  
    for i in range(1, len(S)):  
        if S[i] > max_so_far:  
            max_so_far = S[i]  
    return max_so_far
```