

15-112 Fundamentals of Programming

Lecture 6 - Loops

جامعة كارنيجي ميلون في قطر
Carnegie Mellon Qatar

Announcements

- Read pages 118-123 (Crash Course)
 - You can skip the sections on using “break” and “continue”
- Assignment 2 is due Tuesday, Sept 10

جامعة كارنيجي ميلون في قطر
Carnegie Mellon Qatar

Today's lecture

□ Repetition

One more

□ **nearestBusStop(street)**

Write the function `nearestBusStop(street)` that takes a non-negative int `street` number, and returns the nearest bus stop to the given street, where buses stop every 8th street, including street 0, and ties go to the lower street, so the nearest bus stop to 12th street is 8th street, and the nearest bus stop to 13 street is 16th street.

Repetition

- ❑ I will think of a number between 1 – 100, you try to guess it
- ❑ How would you do this in Python?

While loop

While (some condition is true) :

first statement

second statement

....

Outside of Loop

} Inside the loop
(Loop Body)

Using While loops

- ❑ Read grades from the user, until the user enters -1. Print the average of all grades.

For Loop

- ❑ Normally used when you want to execute some code a fixed or known number of times
- ❑ Example: Print a name 10 times
name = input("Enter your name")
for x in range(10):
print (name)

Range Function

□ What does range function do?

- `range(a,b)`
 - + Generate a list of numbers from a to b – not including b
- `range(a,b,i)`
 - + Generate a list of numbers a to b in increments of i
 - + `range(3,11,2) = [3,5,7,9]`
 - + `range(4,12,5) = [4,9]`
 - + `range(12,4,-2) = [12,10,8,6]`

for Loop

`for i in range(4,10)`

=

for each value of i in [4,5,6,7,8,9]

During the loop:

First iteration	→ i = 4
Second iteration	→ i = 5
Third iteration	→ i = 6
Fourth iteration	→ i = 7
Fifth iteration	→ i = 8
Sixth iteration	→ i = 9

Example

- Print the sum of all numbers from 1 – 10

```
sum = 0
```

```
for i in range(1,11):
```

```
    sum = sum + i
```

```
print (sum)
```

Another Example of for loop

- Read a string from the user, print each character of the string on a separate line

```
value = input("Enter a string")
```

```
for i in range(0,len(value)):
```

```
    print (value[i])
```

Nested Loops

```
for i in range(0,2):  
    for j in range(0,3):  
        print (i," ",j)
```

What would be the output?

Nested Loops

```
for i in range(0,5):  
    for j in range(i,5):  
        print (i," ",j)
```

What would be the output?

Nested Loops

```
for i in range(0,5):  
    for j in range(0,i):  
        print (i," ",j)
```

What would be the output?

Conditionals in loops

```
for i in range(0,20):  
    if i % 2 == 1:  
        print (i)
```

What would be the output?

Problem solving using loops

❑ **isPerfectSquare(n)**

Write a function that takes an integer and returns True if it is a perfect square (the square of another integer) and False otherwise.

❑ **hasConsecutiveDigits(n)**

❑ **PrintnthPrime(n)**

Problem solving using loops

Write the function `nthFibonacciNumber` that takes a positive integer `n` and returns the `n`th Fibonacci number, so:

`nthFibonacciNumber(1)` returns 1

`nthFibonacciNumber(2)` returns 1

`nthFibonacciNumber(3)` returns 2

`nthFibonacciNumber(4)` returns 3

`nthFibonacciNumber(5)` returns 5

`nthFibonacciNumber(6)` returns 8