

Lesson 4

October 2, 2017

0.0.1 Exercise 1 - Biggest of two numbers - Are these programs equivalent? Why

In []: *### program 1*

```
x = 10
y = 5
if(x > y):
    print('x is bigger')
elif (y < x):
    print('y is bigger')
else:
    print('equal')
```

In []: *### program 2*

```
x = 10
y = 5
if (x = y):
    print('equal')
elif(x > y):
    print('x is bigger')
else:
    print('y is bigger')
```

In []: *## program 3*

```
diff = x - y
if (diff == 0):
    print('equal')
elif(diff > 0):
    print('x is bigger')
else:
    print('y is bigger')
```

0.0.2 Answer

- Problem 3 is correct.
- Program 1's first and second condition are actually the same, the variables are just swapped, they both check that y is less than x. So if y is bigger than x, the program will print 'equal'. if we change the second condition to be "y>x" instead of "y<x" , the program will be correct

- Program 2 has a syntax error in the first if condition, we use "==" for comparing equality and one "=" to do assignment.

0.0.3 Exercise 2 - Absolute number

Write a program that calculates the absolute value of a number

Example: - num = 10, output = 10 - num = -10, output = 10

(the absolute of a positive number is just the same number, the absolute of negative number is the positive version of number)

```
In [1]: ## Answer
        num = input('Enter a number')

        if(num >= 0):
            print(num)
        else:
            print(-1*num)
```

```
Enter a number10
10
```

0.0.4 Exercise 3 - Repeat the text

write a program which takes as input text and a number n, and prints out the text repeated n times

Example: - text = 'hello', n = 3, outputs => hello hello hello - text= 'hi', n = 2, outputs => hi hi

Hint: Check string operations from last lecture

```
In [3]: ### Answer
        text = raw_input('Enter text ')
        n = input('Enter number ')
        print(text * n)
```

```
Enter text hello
Enter number 5
hellohellohellohellohello
```

0.0.5 Exercise 4 - Sum from 1 to n

write a program that takes a number as input and outputs the sum from 1 to this number.

Example: n= 5, output= 1 + 2 + 3 + 4 + 5 = 15

```
In [5]: n = input('Enter a number ')
        i = 1
        sum = 0
        while i <=n:
            sum = sum + i
            i = i + 1
```

```
print(sum)
```

Enter a number 5

15

0.0.6 Strings & Lists - Revisiting

Strings and lists are similar. String can be considered as a special case of list. It has a list of letters/characters. List can contain of any type of elements.

```
list_numbers = [1,2,3,4]
list_strings = ["hello", "world", "hii"]
list_mixed = [1, "hello", 4, 5.0]
list_of_lists = [[1,2,3],['a','b','c']]
```

**** strings and lists have many similar in the operations that you can perform on them ****

```
In [3]: text = 'hello'
```

```
In [4]: ## get first character of string
        text[0]
```

```
Out[4]: 'h'
```

```
In [ ]: ## get length of string
```

```
In [22]: len(text)
```

```
Out[22]: 5
```

```
In [5]: ## get last character of string
        text[4]
```

```
Out[5]: 'o'
```

```
In [13]: list_numbers = [1, 2, 3, 4, 10]
```

```
In [11]: ## get first element of list
         list_numbers[0]
```

```
Out[11]: 1
```

```
In [14]: ## get number of elements in list
         len(list_numbers)
```

```
Out[14]: 5
```

```
In [15]: ## get last element of list
        list_numbers[4]
```

```
Out[15]: 10
```

```
In [22]: ## concatenating/appending two strings
        text = 'hello'
        text + '....'
```

```
Out[22]: 'hello...'
```

```
In [6]: ### appending two lists
        list_numbers = [1, 2, 3, 4, 10]
        list_numbers + [11,12,13]
```

```
Out[6]: [1, 2, 3, 4, 10, 11, 12, 13]
```

```
In [41]: ## checking if a string contains another string
        substring = 'ell'
        if(substring in text):
            print 'text contains ell'
```

```
text contains ell
```

```
In [7]: ## checking if an element is in a list
        num = 1
        if(num in list_numbers):
            print 'list contains 1'
```

```
list contains 1
```

0.0.7 Exercise 5 - Are these 3 programs equivalent ? Why?

```
In [ ]: ### Program 1
        text = 'hello'

        for letter in text:
            print(letter)
```

```
In [ ]: ## Program 2
        text = "hello"
        index = 0
        while index < len(text):
            print(text[index])
            index = index + 1
```

```
In [ ]: text = "hello"
        letters = ['h','e','l','l','o']
        count = 0

        while count <= len(letters)-1:
            print(letters[count])
            count = count + 1
```

0.0.8 Answer

All above three programs are correct. - Program 1 uses a for loop to go through each letter in string and prints it - Program 2 uses while loop and a variable index, used to access each character from string. The index is incremented by 1 in each iteration, to go to the next letter. - Program 3 uses while loop as well, but the text is represented as a list of characters instead of a string.

0.0.9 Exercise 6 - Occurrences of a letter in text

Write a program that takes a text from user and a letter, and output the number of occurrences of that letter in the string. **Use while loop and not for loop!**

Hint: - you can use len() to know the # of characters of the string. - Example: - len('hello') gives as output 5

```
In [13]: ### Answer
```

```
text = raw_input('Enter text ')
special_letter = raw_input('Enter letter ')
index = 0
letter_count = 0
while index < len(text):
    if text[index] == special_letter:
        letter_count = letter_count + 1
    index = index + 1
print(letter_count)
```

```
Enter text hello
Enter letter l
2
```

0.1 Homework

0.2 Exercise 7

Write a program that takes from user a number n and prints out the product from 1 till n.

Example:

- n = 2, output = 1*2 = 2
- n = 3, output = 1 * 2 * 3 = 6

```
In [16]: n = int(input('Please enter the number n:'))
        i = 1
        result = 1

        while i <= n:
            result = result * i
            i = i + 1

        print('If you multiply all numbers from 1 to n, you will get:')
        print(result)
```

Please enter the number n:3

If you multiply all numbers from 1 to n, you will get:

6

0.2.1 Exercise 8

Write a program that takes from user text as input and outputs how many vowels occur in text.
vowels: a, e, i, o, u.

Example: - text = 'hello', output = 2 - text = 'cat', output = 1

```
In [17]: vowels = ['a','e','i','o','u']

        str = raw_input('Please enter a string: ')
        vowels_counter = 0

        for letter in str:
            if letter in vowels:
                vowels_counter = vowels_counter + 1

        print('Number of vowels in your string:')
        print(vowels_counter)
```

Please enter a string: hello

Number of vowels in your string:

2

0.2.2 Exercise 9 - Year by Year Balance

You have amount X saved in the bank. Each year your balance in the bank increases by interest rate 2%

Example: - if in 2016 you had an amount 100 euros in the bank - in 2017, it will be 102 - in 2018, it will be 104.04

Assuming the amount in the bank doesn't change (you do not spend from it or add to it)
Below is a program that takes as input the amount you have in the bank (e.g. 100) and the interest rate (e.g. 0.2), then print the balance for next 5 years.

*modify the program so that you take the number of years as input n, and print the balance for each year (from year 1 till year n)

```
In [18]: money = int(input('How much money will you put to your account:'))
         interest = int(input('What is the interest your bank is offering (in percent):'))
         total_years = int(input('How many years will your money be stored in the bank:'))

         year = 1
         while year <= total_years:
             money = money + money*(interest/100.0)
             print('Year:')
             print(year)
             print('Result:')
             print(money)
             print('\n')
             year = year + 1
```

```
How much money will you put to your account:100
What is the interest your bank is offering (in percent):2
How many years will your money be stored in the bank:3
Year:
1
Result:
102.0
```

```
Year:
2
Result:
104.04
```

```
Year:
3
Result:
106.1208
```

0.2.3 Exercise 10- Reverse a string

Write a program which takes a text string from user, and prints out the reverse string.

Example: - text = 'hello', output = 'olleh'

```
In [19]: str = raw_input('Please enter a string: ')
         result = ''

         index = len(str) - 1
```

```
while index >= 0:
    result = result + str[index]
    index = index - 1

print('Your string reversed:')
print(result)
```

Please enter a string: 123456789
Your string reversed:
987654321