

## 0.0.1 ICS 104 - Introduction to Programming in Python and C

# 1 Programming with numbers and Strings 2

## 1.1 Lab Learning Outcomes

- learn how to use Python strings.
- create programs that read and process inputs, and display the results.

## 1.2 Some String Methods (Section 2.4.5 in the textbook)

### 1.2.1 The notion of an object and associated methods

- an object is a software entity that represents a **value** with certain **behavior**.
  - The value can be simple, such as a **string** or complex, such as a **data file**.
  - The behavior of an object is given through its **methods**.
- A method, like a function, is a collection of programming instructions that carry out a particular task.
  - But unlike a function, which is a standalone operation, a method can only be applied to an object of the type for which it was defined.

### 1.2.2 An example

- Consider the `upper` method associated with strings

In [ ]:

```

1  %%writefile lab03Example.py
2  ## Uncomment the above line after you finish your code and want to save it in a file.
3
4  name = "John Smith"  # name is the object
5  uppercaseName = name.upper() # upper is the method
6  print(uppercaseName)
7  print(name)

```

- Note here that the **upper** method results in a new string, i.e., it does NOT UPDATE the current string.

### 1.2.3 Summary of some string methods

Method	Returns
<code>s.lower()</code>	A lowercase version of string <i>s</i> .
<code>s.upper()</code>	An uppercase version of <i>s</i> .
<code>s.replace(<i>old</i>, <i>new</i>)</code>	A new version of string <i>s</i> in which every occurrence of the substring <i>old</i> is replaced by the string <i>new</i> .

### 1.3 Instructions:

- Solve exercise 1,2,3 and 4 in the respective cells below. Name your Jupyter notebook in the format:

YourKFUPMID\_LabSectionNumber\_Lab03

- Submit in Your Lab Section Blackboard by the submission deadline stated by your lab instructor.

### 1.4 Exercises

```
1  ### Exercise 1
2  Write an interactive Python3 program that prompts for and reads an integer number between 1,100 and
   999,999. It then prints the number with a comma separating the thousand.

3  Hint: use % and // division. Also assume that the number formed by the last 3 digits is >= 100
4
5  Sample program runs:
6
7  Please enter a number between 1,100 and 999,999:  1234
8
9  1,234
10
11 -----
12
13 Please enter a number between 1,100 and 999,999:  45786
14
15 45,786
16
17 -----
18
19 Please enter a number between 1,100 and 999,999: 999999
20
21 999,999
22
23 -----
24
25
```

In [15]:

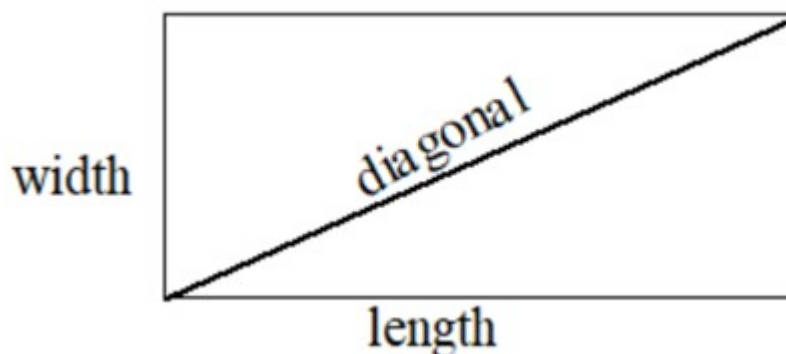
```
1  %%writefile lab03Ex1_YourID.py
2  ## Uncomment the above line after you finish your code and want to save it in a file.
3
4  # YOUR CODE HERE
5
6  number =int(input("Please enter a number between 1,100 and 999,999 : "))
7  num1= number //1000
8  num2= number % 1000
9
10
11 print(num1,num2, sep = ",")
12
```

Please enter a number between 1,100 and 999,999 : 1234  
1,234

### 1.4.1 Exercise 2

Write an interactive Python3 program that prompts for and reads the area and the length of a rectangle in square centimeters. It then calculates and prints:

- The perimeter of the rectangle in centimeters.
- The length of the diagonal in inches.



Note:

- Your program must declare an appropriate constant.
- 1 inch = 2.54 centimeters

Sample program runs:

Enter the area of a rectangle in square cm: 500.0

Enter the length of the rectangle in cm: 25.6

Perimeter = 90.26 cm, Diagonal = 12.68 inches.

Enter the area of a rectangle in square cm: 36.0

Enter the length of the rectangle in cm: 6.0

Perimeter = 24.00 cm, Diagonal = 3.34 inches.

In [16]:

```
1  %%writefile lab03Ex2_YourID.py
2  ## Uncomment the above line after you finish your code and want to save it in a file.
3
4  # YOUR CODE HERE
5
6  from math import *
7  INCH_IN_CM = 2.54
8  area = float(input("Enter the area of a rectangle in square cm: "))
9  length = float(input("\nEnter the length of the rectangle in cm: "))
10 width = area / length
11 perimeter = 2 * (length + width)
12 diagonal = sqrt(length**2 + width**2)
13 diagonal = diagonal/INCH_IN_CM
14 print("\nPerimeter =",round(perimeter,2),"cm , " , "Diagonal =",round(diagonal,2),"inches")
```

Enter the area of a rectangle in square cm: 36

Enter the length of the rectangle in cm: 6

Perimeter = 24.0 cm , Diagonal = 3.34 inches

### 1.4.2 Exercise 3

A student password is formed as follows:

- Student's first name in lowercase.
- Followed by last character in uppercase
- Followed by first character in uppercase
- Followed by \$ character
- Followed by student's year of birth \* 2

Write an interactive Python3 program that prompts and reads a student's first name and year of birth. It then creates and prints the student password.

Sample program runs:

Enter student's first name: MUHSIN

Enter student's year of birth: 1982

Password = muhsinNM\$3964

---

Enter student's first name: Saleem

Enter student's year of birth: 2005

Password = saleemMS\$4010

---

In [19]:

```
1  %%writefile lab03Ex3_YourID.py
2  ## Uncomment the above line after you finish your code and want to save it in a file.
3
4  # YOUR CODE HERE
5
6  name=str(input("Enter student's first name: "))
7  yearOfBirth=int(input("Enter student's year of birth:"))
8  a=name[-1]
9  b=name[0]
10 print(name.lower()+a.upper()+b.upper(),"$",2*yearOfBirth,sep="")
11
```

```
Enter student's first name: MUHSIN
Enter student's year of birth:1982
muhsinNM$3964
```

### 1.4.3 Exercise 4

Write an interactive Python3 program that prompts for a measurement in kilometers. It then converts it to miles, feet, and inches.

Note:

1 mile = 1.609344 kilometers

1 mile = 5280 feet

1 foot = 12 inches

Sample program runs:

Enter distance in kilometers: 626.5

626.50 kilometers equals 389 miles, 1526 feet, and 2.33 inches

Enter distance in kilometers: 8.0

8.00 kilometers equals 4 miles, 5126 feet, and 8.63 inches

Enter distance in kilometers: 1.2

1.20 kilometers equals 0 miles, 3937 feet, and 0.09 inches

In [3]:

```
1 ##### %writefile Lab03Ex4_YourID.py
2 ## Uncomment the above line after you finish your code and want to save it in a file.
3
4 # YOUR CODE HERE
5
6 km = float(input("Enter distance in kilometers: "))
7
8 km_to_inches = (km / 1.609344) * 5280 * 12
9
10 fraction_inches = km_to_inches - int(km_to_inches)
11 inches = int(km_to_inches)
12
13 feet = inches // 12
14 inches %= 12
15 inches += fraction_inches
16
17 miles = feet // 5280
18 feet %= 5280
19
20 print("%.2f kilometers equals %.f miles, %.f feet, and %.2f inches" %(km, miles, feet, inches))
21
```

Enter distance in kilometers: 1.2

1.20 kilometers equals 0 miles, 3937 feet, and 0.09 inches

1 .....