

Module 2: Python Programming Fundamentals

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Topics to be covered in Module 2,

- Introduction to Python
- Interactive and Script mode
- Indentation
- Comments
- Variables
- Reserved words
- Data Types
- Operators and Precedence
- Expressions Built-in functions
- Importing from packages

Data Types

Other than String - Data Types

Example (Python Snippet)

```
name = print(len('python'))  
name
```

```
phone_number = print(len(7358679961))  
phone_number
```

Basic Data Types

- String
- Integer
- Float
- Boolean

Example (String - Subscripting)

```
print('Hello' [0])  
print('Hello' [2])  
print('Hello' [4])
```

Example (String - anything single or double quote)

```
print('123'+ 'python')
```

Example (Numbers without any decimal)

```
print(123 + 456)
```

```
num1 = 10
```

```
num2 = 30
```

```
add_ = num1 + num2
```

```
print(add_)
```

3,42,654,896 ?

Example (Numbers with any decimal)

```
print(123.540 + 456.454564654)
```

```
num1 = 10.0
```

```
num2 = 30.3
```

```
add_ = num1 + num2
```

```
print(add_)
```

Example (Numbers with any decimal)

```
is_sunny = True
is_raining = True
is_chennai = False

print(type(is_sunny))
print(is_sunny)
print(is_raining)
print(is_chennai)
```

Example (Understanding)

1. Which statement is incorrect?
 - a. 932 is an integer
 - b. 'False' is a boolean
 - c. 857.25 is a float
 - d. '523' is a string

Example (Understanding)

2. What is the data type of mystery variable?

```
mystery = 734_529.678
```

- a. Int
- b. Float
- c. Qurtle
- d. String

Example (Indexing)

3. You are now a computer. If I give you the following code, what is the output?

```
street_name = 'Anna Nagar'  
print(street_name[4]+street_name[7])  
print(street_name[3]+street_name[6])
```

Data types

Example (Understanding)

```
print(len('Python'))  
print(len(178963))
```

Example (Understanding)

```
num_char = len(input('who is your crush?'))  
print('my fav crush' + num_char + 'characters')
```

```
type()
```

Example (Understanding)

```
num_char = len(input('who is your crush?'))  
new_num_char = str(num_char)  
print('my fav crush' + new_num_char + 'characters')
```


Type conversion

Example (Understanding)

```
num1 = 123
```

```
type(num1)
```

```
num2 = str(123)
```

```
type(num2)
```

```
num3 = float(123)
```

```
type(num3)
```

Type conversion

Example (Understanding)

```
print(70 + float('100.5'))  
print(str(70) + str(100))
```

Problem3:

Example (Understanding)

Write a program that adds the digits in a 2 digit number.

Ex: if the input was 35, then the output should be $3+5 = 8$?

Example (Understanding)

```
two_digit_number = input('type a two digit number')
print(type(two_digit_number))
first_digit = int(two_digit_number[0])
second_digit = int(two_digit_number[1])
result = int(first_digit) + int(second_digit)
print(result)
```

Mathematical operations

Example (Understanding)

`3 + 5` (Add)

`7 - 4` (Subtract)

`3 * 2` (Multiply)

`6 / 3` (Divide)

`2**2` (Exponential power)

Precedence

- PEMDAS
- P Parenthesis
- Exponential
- Multiplication
- Division
- Addition
- Subtraction
- Left - Right direction

Mathematical operations

Example (Manual)

```
print(3*3+3/3-3)    ?
```

Problem4

Example (Understanding)

```
print(3*3+3/3-3)
```

Output: 3.0 ?

Example (Understanding)

```
print(3*(3+3)/3-3)
```

Example (Understanding)

Write a program that calculates the Body Mass Index (BMI) from a user, weight and height?

$$\text{BMI} = \text{weight (kg)} / \text{height} * \text{height (m.m)}$$

Number manipulation

Example (Understanding)

```
print(8/3)
print(int(8/3))
print(round(8/3))
print(round(8/3,2))
print(round(2.6666666666,2))
print(8//3)
print(type(8//3))
print(type(8/3))
print(type(4/4))
```

Number manipulation

Example (Understanding)

```
score = 0  
print(score)
```

```
score = score + 1  
print(score)
```

```
score += 1  
print(score)
```

```
score -= 1          # score *= 1      score /= 1  
print(score)
```

Number manipulation

Example (Understanding)

```
score = 0
print('Your score is' + score)
print('Your score is' + str(score))
```

- formatted string data
- A way to embed expressions inside string literals, using curly braces .
- The expressions are evaluated at runtime and formatted using the f prefix before the string.
- F-strings provide a concise and readable way to include variables and expressions within strings.

Example (Understanding)

```
name = "Python"  
age = 33  
  
print(f"Hello, my name is {name} and I am {age} years old.")
```

Example (Understanding)

```
score = 0
height = 1.8
isWinning = True
print(f'Your score is {score}')
```

`print(f'your score is {score} and height is {height}`
`and winning is always {isWinning} ')`

Problem6

Example (Understanding)

Create a problem using maths and f-strings that tells us how many weeks we have left, if we live until 85 years old?
Get the input from user!

Output:

You have @@@@ weeks left

Example (Understanding)

```
age = input("What is your current age?")
age = int(age)
no_of_weeks_per_year = 52
no_of_years_left = 85 - age
no_of_weeks_we_live = no_of_years_left * no_of_weeks_per_year
print(f"You have {no_of_weeks_we_live} weeks left")
```

Example (Try manual)

1. You are a computer. what will this line of code print?

```
print(6+4/2-(1*2))
```

- a.3
- b.6.0
- c.8.0
- d.5

Example (Try manual)

2. What is the data type of the result of the variable 'a' in the following line of code?

```
a = int('5')/int(2.7)
```

- a. int
- b. float
- c. str
- d. bool

Example (Try manual)

3. Which of the following lines of code gives error?

a. `age = 12`

```
print('you are' + age + 'years old')
```

b. `age = 12`

```
print(f'you are {age} years old')
```

c. `name = input('whats your name?')`

```
print('hello' + name)
```

d. `name = input('whats your name?')`

```
print(f'hello, {name}')
```

Problem7

Example (Understanding)

Write a Python program that calculates the total bill amount per person after adding a tip and GST. The program should prompt the user to enter the total bill amount, the percentage of tip they would like to give (10, 20, or 50/-), and the number of people among whom the bill will be split. The program should then calculate an 18% GST on the original bill amount and add it to the bill along with the tip. Finally, the program should output the total bill amount (including tip and GST) and how much each person needs to pay.

Problem7

Example (Expected Output)

Welcome to Tip Calculator!

What was the total bill? 5648

What percentage tip would you like to give? 10, 20, or 50? 50

How many people to split the bill? 5

Total bill amount with tip and GST is Rs: 6714.64/-

Each person should pay Rs: 1342.93/-

Example (Python snippet)

```
print('Welcome to Tip Calculator!')

# Get the inputs
bill = input('What was the total bill? ')
bill = float(bill)
tip = input('What percentage tip would you like to give?
            10, 20, or 50? ')

tip = int(tip)
people = input('How many people to split the bill? ')
people = int(people)

# Calculate the GST amount (18%)
gst = 0.18 * bill
```


Example (Python snippet)

```
# Calculate the total bill including tip and GST
bill_with_tip_gst = bill + tip + gst

# Print the total bill amount with tip and GST
print(f'Total bill amount with tip and GST is Rs:
      {bill_with_tip_gst}/-')

# Calculate how much each person should pay
bill_per_person = bill_with_tip_gst / people
final_amount = round(bill_per_person, 2)

# Print the amount each person should pay
print(f'Each person should pay Rs: {final_amount}/-')
```

Problem8

Example (Understanding)

Write a Python program that calculates the final price of a product after applying a discount and sales tax. The program should prompt the user to enter the original price of the product, the discount percentage, and the sales tax percentage. The program should first apply the discount to the original price and then calculate the sales tax on the discounted price. Finally, it should output the final price after applying both the discount and the tax.

For example, if the discount percentage is 15% and the sales tax percentage is 8%, the program should calculate the correct final price based on these inputs.

Problem8

Example (Expected Output)

What is the original price of the product? 12545

What is the discount percentage? 15

What is the sales tax percentage? 8

The final price after discount and tax is Rs: 11516.31/-

Example (Python snippet)

```
# enter the original price of the product
original_price = float(input("What is the original price
                             of the product? "))

# enter the discount percentage
discount_percentage = float(input("What is the discount
                                  percentage? "))

# enter the sales tax percentage
sales_tax_percentage = float(input("What is the sales
                                   tax percentage? "))

# Calculate the discount amount
discount_amount = (discount_percentage / 100)
                  * original_price
```

Example (Python snippet)

```
# Calculate the price after discount
price_after_discount = original_price - discount_amount

# Calculate the sales tax on the discounted price
sales_tax = (sales_tax_percentage / 100) *
            price_after_discount

# Calculate the final price
final_price = price_after_discount + sales_tax
final = round(final_price, 2)

# Output the final price after applying both
print(f'The final price after discount and
      tax is Rs: {final_price}/-')
```

Problem9

Example (Understanding)

Write a Python program that calculates the total amount to be paid on a loan after adding the interest. The program should prompt the user to enter the principal loan amount, the annual interest rate, and the number of years the loan will be held. The program should calculate the total amount to be paid after applying the interest for the given period. Additionally, it should calculate how much needs to be paid per month.

For example, if the annual interest rate is 9.5% and the loan period is 2 years, the program should accurately calculate the total amount to be paid and the monthly payment.

Example (Expected Output)

```
What is the principal loan amount? 500000  
What is the annual interest rate (in %)? 9.5  
For how many years will the loan be held? 2  
Total amount to be paid after 2 years is: 595000.0  
Monthly payment is: 24791.666666666668
```

Example (Python snippet)

```
# enter the principal loan amount
principal = float(input("What is the principal loan
                        amount? "))

# enter the annual interest rate (in %)
annual_interest_rate = float(input("What is the annual
                                   interest rate (in %)? "))

# enter the number of years the loan will be held
years = int(input("For how many years will
                  the loan be held? "))

# Calculate the total interest over the entire period
total_interest = (annual_interest_rate / 100) *
                  principal * years
```


Example (Python snippet)

```
# Calculate the total amount to be paid (principal +
                                total interest)
total_amount = principal + total_interest

# Calculate the monthly payment amount
monthly_payment = total_amount / (years * 12)

# Output the total amount to be paid and the
#monthly payment amount
print(f'Total amount to be paid after {years}
                                years is: {total_amount}')
print(f'Monthly payment is: {monthly_payment}')
```

Verdict from Module 2

- fundamental blocks necessary for the complex code

Doubts or Questions



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**Learning gives Creativity,
Creativity leads to Thinking,
Thinking provides Knowledge,
and
Knowledge makes you Great
- Dr APJ Abdul Kalam**