INFORMATICS PRACTICES

Practical File

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Submitted To:
Mr. Dheeraj Sir

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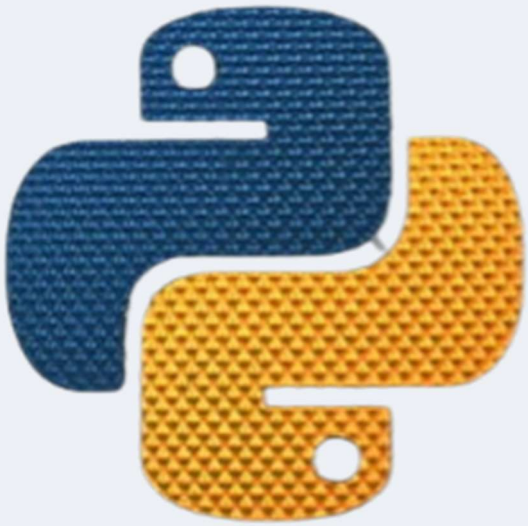
Python Programming Language

*Python is an object oriented, high-level computer programming language. It is an interpreted and dynamically-typed language. It was created by Guido Van Rossum in February 1991 when he was at Centrum Wiskunde & Informatica (**CWI**) which is a Mathematics & Computer Science Institute in the Netherlands. Python has become popular over the years and is actively used in many educational and professional environments. It can be used for multiple things such as development of applications, websites, artificial intelligence and high-security servers.*

Features

- Object Oriented & Dynamically Typed
- Easy to learn syntax
- It is cross-platform, meaning it supports many devices such as Windows, Mac, Linux PCs and even smartphones.
- It is free and open-source
- Comes included with a lot of functionality through its standard library
- Has a wide variety of applications



Cons

- Time taken to execute code is slower than some compiled languages
- Fewer available libraries
- Difficult to convert to other languages

Contents

Q. Write a python program to calculate percentage based on marks of 5 subjects of a student.

Code:

```
# Program to caculate percentage in exams

# Take input and create variables
subjects = int(input('How many subjects do you have?: '))
scored_marks = 0
total_marks = 0

# Enquire marks using loop
for i in range(subjects):
    marks = str(input(f'Enter marks in subject {i + 1} in format => Scored/Max [Example:
66/70]: ')).replace(' ', '').split('/')
    scored_marks += float(marks[0])
    total_marks += float(marks[1])

# Calculate percentage and show output
percentage = (scored_marks / total_marks) * 100
print(f'Your percentage is: {round(percentage, 2)}%')
```

Output:

```
How many subjects do you have?: 3
Enter marks in subject 1 in format => Scored/Max [Example: 66/70]: 66/70
Enter marks in subject 2 in format => Scored/Max [Example: 66/70]: 70/70
Enter marks in subject 3 in format => Scored/Max [Example: 66/70]: 52/80
Your percentage is: 85.45%
>>>
```

Q. Write a program to calculate monthly EMI cost of a product with given price, duration and interest.

Code:

```
# Program to calculate EMI with amount, duration and interest

# Take inputs

amt = float(input('Enter product\'s full amount: '))
time = int(input("Enter duration of the EMI (in months): "))
intrst = (float(input("Enter interest in %: ").strip().replace('%', '')) / 12) / 100

# Calculate EMI amount

emi = amt * intrst * (1 + intrst) ** time / ((1 + intrst) ** time - 1)

# Show output
print(f'Your EMI should cost you Rs. {round(emi, 2)} per month')
```

Output:

```
Enter product's full amount: 1000000
Enter duration of the EMI (in months): 120
Enter interest in %: 7.2
Your EMI should cost you Rs. 11714.19 per month
>>>
```

Q. Write a program to calculate the area of a triangle using Heron's Formula.

Code:

```
# Program to calculate triangle area using heron's formula

# Take input
side1 = float(input("Enter length of 1st side: "))
side2 = float(input("Enter length of 2nd side: "))
side3 = float(input("Enter length of 3rd side: "))

# Calculate area
half_p = (side1 + side2 + side3) / 2
area = ((half_p) * (half_p - side1) * (half_p - side2) * (half_p - side3)) ** 0.5

# Show output
if area == 0:
    print('\nInvalid triangle measurements.') # Tell user if measurements are invalid
else:
    print(f"\nArea of this triangle is: {str(area)} square-unit")
```

Output:

```
Enter length of 1st side: 4
Enter length of 2nd side: 5
Enter length of 3rd side: 6

Area of this triangle is: 9.921567416492215 square-unit
>>>
```

Q. Write a program to calculate permutations and combinations using their mathematical formulas.

Code:

```
# Program to find permutations and combinations

n = int(input("Enter total number of objects (n): "))
r = int(input("Enter number of selected objects (r): "))

# Calculate factorials

if (0 <= r) and (r <= n):
    n_factorial = 1
    for i in range(1, n+1):
        n_factorial *= i

    r_factorial = 1
    for i in range(1, r+1):
        r_factorial *= i

    nr_factorial = 1
    for i in range(1, (n-r)+1):
        nr_factorial *= i

    # Calculate permutations and combinations

    permu = n_factorial / nr_factorial
    combi = n_factorial / (r_factorial * nr_factorial)

    # Show output
    print(f"Permutations: {permu}\nCombinations: {combi}")

else:
    print("Invalid inputs. Correct formula is: 0 <= r <= n")
```

Output:

```
Enter total number of objects (n): 6
Enter number of selected objects (r): 4
Permutations: 360.0
Combinations: 15.0
```

Q. Write a program to calculate the sale price of a product with given price and discount in %

Code:

```
# Program to calculate sale price of a product after discount

initial_price = float(input("Enter price of the products in Rupees: "))
discount = float(input("Enter discount in percentage: ").strip().replace("%", ''))

# Calculate discount

perc = (initial_price * discount) / 100
final_price = initial_price - perc

# Show final price

print(f"The final price of the product is: Rs. {final_price}")
```

Output:

```
Enter price of the products in Rupees: 100
Enter discount in percentage: 20
The final price of the product is: Rs. 80.0
>>>
```

Q. Write a program to calculate Simple Interest and Compound Interest with given Principle, Rate and Time.

Code:

```
# Program to calculate compound interest and simple interest

# Take input
p = float(input("Enter the principle amount: "))
r = float(input("Enter rate (% per annum): "))
t = float(input("Enter time (years): "))

# Calculate simple interest
si = (p * r * t) / 100

# Calculate compound interest
ci = (p * (1 + r / 100) ** t) - p

print(f'Simple Interest: {si}\nCompound Interest: {ci}')
```

Output:

```
Enter the principle amount: 1000
Enter rate (% per annum): 5
Enter time (years): 2
Simple Interest: 100.0
Compound Interest: 102.5
>>>
```

Q. Write a program to calculate the sum of squares of first X natural numbers.

Code:

```
# Program to calculate the sum of squares of first X natural numbers

# Take input
x = int(input("Enter a positive integer: "))

# Calculate
if x < 1:
    print("Invalid input. Please enter a positive integer.")
else:
    total = 0
    for i in range(1, x + 1):
        total += i ** 2

    # Show output
    print(f"The sum of the squares of the first {x} natural numbers is: {total}")
```

Output:

```
Enter a positive integer: 4
The sum of the squares of the first 4 natural numbers is: 30
>>>
```

Q. Write a program to print the multiplication table of any number

Code:

```
# Program to print tables of any input number

# Take input
num = float(input("Which number's table do you want to know?: "))
times = int(input("How many table multiplications do you want to print?: "))

for i in range(times):
    print(f'{num} x {i + 1} = {num * (i + 1)}')
```

Output:

```
Which number's table do you want to know?: 5
How many table multiplications do you want to print?: 12
5.0 x 1 = 5.0
5.0 x 2 = 10.0
5.0 x 3 = 15.0
5.0 x 4 = 20.0
5.0 x 5 = 25.0
5.0 x 6 = 30.0
5.0 x 7 = 35.0
5.0 x 8 = 40.0
5.0 x 9 = 45.0
5.0 x 10 = 50.0
5.0 x 11 = 55.0
5.0 x 12 = 60.0
>>>
```

Q. Write a program to print the area of triangle using base/height formula

Code:

```
# Program to calculate area of a triangle using both Heron's formula and Base/Height formula

# Take input
base = float(input("Enter base of triangle: "))
height = float(input("Enter height of triangle: "))

# Calculate and output area
area = (base * height) / 2
print(f"\nArea of this triangle is: {str(area)} square-unit")
```

Output:

```
Enter base of triangle: 10
Enter height of triangle: 5

Area of this triangle is: 25.0 square-unit
>>>
```

Q. Write a program to print the trigonometric values of a right-angled triangle

Code:

```
# Program to calculate several values of a triangle

p = float(input("Enter the perpendicular length of triangle: "))
b = float(input("Enter the base length of triangle: "))
h = float(input("Enter the hypotenuse of triangle: "))

if (p <= 0) or (h <= 0) or (b <= 0):
    output = "Invalid Input."
else:
    # Calculate values
    peri = p + b + h
    half_p = (p + b + h) / 2 # Half perimeter for area
    area = ((half_p) * (half_p - p) * (half_p - b) * (half_p - h)) ** 0.5 # Area

    if area == 0.0:
        output = "Invalid triangle measurements."
    else:
        output = f"""
Mathematical values of this triangle are:

Area = {round(area, 2)} square-unit
Perimeter = {peri} unit

Trigonometric Values of this triangle are:

Sin = {p}/{h} = {p/h}
Cos = {b}/{h} = {b/h}
Tan = {p}/{b} = {p/b}
Cosec = {h}/{p} = {h/p}
Sec = {h}/{b} = {h/b}
Cot = {b}/{p} = {b/p}
"""

print(output)
```

Output:

```
Enter the perpendicular length of triangle: 4
Enter the base length of triangle: 3
Enter the hypotenuse of triangle: 5

Mathematical values of this triangle are:

Area = 6.0 square-unit
Perimeter = 12.0 unit

Trigonometric Values of this triangle are:

Sin = 4.0/5.0 = 0.8
Cos = 3.0/5.0 = 0.6
Tan = 4.0/3.0 = 1.3333333333333333
Cosec = 5.0/4.0 = 1.25
Sec = 5.0/3.0 = 1.6666666666666667
Cot = 3.0/4.0 = 0.75

>>>
```

THANK YOU