

# **Introduction to Computing**

## **Python Concepts (Operators, Conditionals, Looping)**

### **Practice Assignment # 1**

#### **Basic Programming Concepts and use of Operators**

1. Write a program that asks the user to enter two numbers, obtains them from the user and prints their sum, product, difference, quotient and remainder.
2. The distance between two cities (in km.) is input through the keyboard. Write a program to convert and print this distance in meters, feet, inches and centimeters.
3. Write a program that takes the marks obtained by a student in five different subjects as input through the keyboard, then find out the total marks and percentage marks obtained by the student in each subject. Assume that the maximum marks that can be obtained by a student in each subject is 100.
4. Temperature of a city in Fahrenheit degrees is input through the keyboard. Write a program to convert this temperature into Centigrade degrees.
5. The length & breadth of a rectangle are input through the keyboard. Write a program to calculate the area & perimeter of the rectangle.
6. Two numbers (base and exponent) are entered through the keyboard. Write a program to find the value of base raised to the power of exponent.
7. If a five-digit number is input through the keyboard, write a program to calculate the sum of its digits. (Hint: Use the modulus operator '%' to split the digits).
8. Write a program that reads in the radius of a circle and prints the circle's diameter, circumference and area. Use the constant value 3.14159 for pi. Perform each of these calculations inside the print statement(s) and use the conversion format specifier %f.

## Conditionals

9. A company insures its drivers in the following cases:

- If the driver is married.
- If the driver is unmarried, male & above 30 years of age.
- If the driver is unmarried, female & above 25 years of age.

In all other cases, the driver is not insured. If the marital status, sex and age of the driver are the inputs, write a program to determine whether the driver is to be insured or not.

10. Write a program that take *year* as an input from user. Determine whether year is leap year or not.
11. Write a program that reads an integer and determines and prints whether it's odd or even.
12. Write a program that reads in two integers and determines and prints whether the first is a multiple of the second. [*Hint*: Use the remainder operator.]
13. Write a program that asks the user to enter two integers, obtains the numbers from the user, then prints the larger number followed by the words "is larger." If the numbers are equal, print the message "These numbers are equal." Use only the single-selection form of the if statement you learned in this chapter.
14. Write a program that inputs three different integers from the keyboard (i.e num1, num2, num3), then prints the sum, the average, the product, the smallest and the largest of these numbers. The screen dialogue should appear as follows:

Enter three different integers: 13 27 14

Sum is 54

Average is 18

Product is 4914

Smallest is 13

Largest is 27

15. (**Body Mass Index Calculator**) We introduced the body mass index (BMI) calculator in The formulas for calculating BMI are

$$BMI = (weightInKilograms) / (heightInMeters * heightInMeters)$$

Create a BMI calculator application that reads the user's weight in kilograms and height in meters, then calculates and displays the user's body mass index. Also, the application

should display the following information from the Department of Health and Human Services/National Institutes of Health so the user can evaluate his/her BMI:

**BMI VALUES**

Underweight: less than 18.5

Normal: between 18.5 and 24.9

Overweight: between 25 and 29.9

Obese: 30 or greater

16. Write a program to check whether a triangle is valid or not, when the three angles of the triangle are entered through the keyboard. A triangle is valid if the sum of all the three angles is equal to 180 degrees.
17. Given the length and breadth of a rectangle, write a program to find whether the area of the rectangle is greater than its perimeter. For example, the area of the rectangle with length = 5 and breadth = 4 is greater than its perimeter.
18. A library charges a fine for every book returned late. For first 5 days, the fine is 50 paise, for 6-10 days fine is one rupee and above 10 days fine is 5 rupees. If you return the book after 30 days your membership will be cancelled. Write a program to accept the number of days the member is late to return the book and display the fine or the appropriate message.
19. If the three sides of a triangle are entered through the keyboard, write a program to check whether the triangle is isosceles, equilateral, scalene or right-angled triangle.
20. A university has the following rules for a student to qualify for a degree with A as the main subject and B as the subsidiary subject:
  - (a) He should get 55 percent or more in A and 45 percent or more in B.
  - (b) If he gets less than 55 percent in A he should get 55 percent or more in B. However, he should get at least 45 percent in A.
  - (c) If he gets less than 45 percent in B and 65 percent or more in A he can reappear in an examination in B to qualify.
  - (d) In all other cases he is declared to have failed.

Write a program to receive marks in A and B and Output whether the student has passed, failed or can reappear in B.

## Looping

21. Write a program that calculates the squares and cubes of the numbers from 0 to 10 and uses tabs to print the following table of values:

number	square	cube
0	0	0
1	1	1
2	4	8
3	9	27
4	16	64
5	25	125

22. Write a program that calculates and prints the sum of the even integers from 2 to 30.
23. Write a program to enter the numbers till the user wants and at the end it should display the count of positive, negative and zeros entered.
24. Write a program to find the binary equivalent of the entered number., i.e. binary equivalent of 170 is 10101010
25. Write a program to find the range of a set of numbers. Range is the difference between the smallest and biggest number in the list. You are not allowed to use built-in range() function.
26. Write a program to generate all combinations of 1, 2 and 3 using **for** loop.
27. Develop a program that will determine the gross pay for each of several employees. The company pays “straight time” for the first 40 hours worked by each employee and pays “time-and-a-half” for all hours worked more than 40 hours. You’re given a list of the employees of the company, the number of hours each employee worked last week and the hourly rate of each employee. Your program should input this information for each employee and should determine and display the employee's gross pay. Here is a sample input/output dialog:
- Enter # of hours worked (-1 to end): **39**  
Enter hourly rate of the worker (\$00.00): **10.00**  
Salary is \$390.00
- Enter # of hours worked (-1 to end): **40**  
Enter hourly rate of the worker (\$00.00): **10.00**  
Salary is \$400.00
- Enter # of hours worked (-1 to end): **41**

Enter hourly rate of the worker (\$00.00): **10.00**

Salary is \$415.00

Enter # of hours worked (-1 to end): **-1**

28. The factorial of a non negative integer  $n$  is written  $n!$  (pronounced " $n$  factorial") and is defined as follows:

$n! = n \cdot (n - 1) \cdot (n - 2) \cdot \dots \cdot 1$  (for values of  $n$  greater than or equal to 1)

and  $n! = 1$  (for  $n = 0$ ).

For example,  $5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1$ , which is 120.

Write a program that take a number ( $n$ ) from user, find and print factorial of that number.

29. Write a program to produce the following output using loop:

```

                1
            2        3
        4            5        6
    7        8            9        10
```

30. Write a program that takes the side of a square from user and then prints that square out of asterisks. Your program should work for squares of all side sizes between 1 and 20.

For example, if your program reads a size of 4, it should print

```
****
****
****
****
```

31. Write a program that displays the following checkerboard pattern:

```
* * * * *
* * * * *
 * * * * *
* * * * *
 * * * * *
* * * * *
 * * * * *
* * * * *
```

Your program must use only three output statements, one of each of the following forms:

```
print "*" "
```

```
print " " "
```

[illegible]

a) not( x <5 ) and not( y >= 7 )  
b) not( a == b ) or not( g != 5 )  
c) not( ( x <= 8 ) and ( y >4 ) )  
d) not( ( i >4 ) or ( j <= 6 ) )

```

*
***
*****
*****
*****
*****
*****
*****
*****
*****

```