Practice Questions

A. Simple Programs

1. Write a program in python to add two numbers and print the result.
2. Write a program in python to find the area of a triangle.
3. Write a program in python to find square root of a number.
4. Write a program in python to solve a quadratic equation.
5. Write a program in python to convert Fahrenheit to Celsius.
6. Write a program in python to find quotient and reminder after division.
7. Write a program in python to swap two numbers using tuple assignment.
8. Write a program in python to find the average of three marks.
9. Write a program in python to calculate simple interest.
10. Write a program in python to calculate the net pay given basic pay, hra, da and deductions.

B. Programs using Conditional Statements

1. Given age determine whether a person is eligible to vote or not. (if else)
2. Check whether a number is odd or even. (if else)
3. Write a program to find largest of two numbers. (if else)
4. Obtain a character convert lower case to uppercase and vice versa. (if else)
5. Find the input year is leap year or not. (if else)
6. Read a number, check if it is positive, negative or zero. Increment the number if it is positive, decrement if it is negative. (elif statement)
7. Create a simple calculator. (elif statement)
8. Estimate the Grade based on the marks obtained by a student. (elif statement)
9. Find the largest of 3 numbers. (elif statement)
10. Obtain a character, check if it is lower case, uppercase or digit. (elif statement)

C. Write python programs for the following problems using sequential construct and implement them.

1) Add, subtract, multiply and divide two integers by getting inputs from the user.
2) Swap the values of two variables using a temporary variable and multiple assignment.
3) Read the marks for five subjects and compute the total and average.
4) Find the area of rectangle, triangle and circle by reading inputs from the user.
5) Compute the square root of a given input number.
6) Calculate Simple Interest.
7) Find the net salary of an employee by getting the basic pay (BP) as input. Compute the net pay basedupon the following formulae:

DA = 88% of BP
HRA = 8% of
BPCCA = Rs.
1000
Insurance = Rs.
2000PF =
10% of BP
Gross Pay = BP + DA + HRA + CCA
Deductions = Insurance + PF
Net Pay = Gross Pay - Deductions

D. Write the output that you obtain for the following Python questions.

1. Write a program to check whether a number is odd or even.
2. Write a program in python to find the biggest of two numbers.
3. Write a program to convert a character from lower case to uppercase and vice versa.
4. Write a program in python to find whether a number is divisible by both 5 and 7 .
5. Write a program to find the input year is leap year or not.
6. Write a program in python to input three sides of a triangle and check whether the triangle is equilateral, isosceles or scalene
7. Write a program in python to input three sides of a triangle and check whether it is right angled one
8. Read a number, check if it is positive, negative or zero. Increment the number if it is positive, decrement if it is negative.
9. Create a simple calculator.
10. Estimate the Grade based on the marks obtained by a student.
11. Obtain a character, check if it is lower case, uppercase or digit.
12. Find the largest of 3 numbers.
13. Obtain a input from the user and display the corresponding data types (primitive and compound data type)

E. Programs for While Loop

1. Compute Exponentiation (power of a number) without using ** operator.
2. Write a program in python to print all the two digit numbers which are eitherdivisible by 3 or by 4.
3. Write a program in python to print the sum of all the digits of a number.
4. Perform the division operation and find the quotient and remainder values.(without using /, // % operators)
5. Check whether the given number is palindrome or not
6. Check whether the given number is Armstrong number or not
7. Compute the GCD of two numbers.(Euclidean Method and using commonfactors)
8. Take integer inputs from user until he/she presses q (Ask to press q to quitafter every integer input). Print average and product of all numbers.
9. Find the square root of a number. (Newton's method)

F. Programs for "For Loop"

1. Write a Python program to construct the following pattern, using a nested forloop.

a.

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

b.

```
1
2 1
3 2 1
4 3 2 1
5 4 3 21
```

c.

```
          1
        1   1
      1   2   1
    1   3   3   1
  1   4   6   4   1
1   5  10  10   5   1
1   6  15  20  15   6   1
```

2. Write a Python program that accepts a word from the user and reverse it.
3. Write a Python program to count the number of even and odd numbers from aseries of numbers.
   Sample numbers : numbers = (1, 2, 3, 4, 5, 6, 7, 8, 9)
4. Write a Python program that prints each item and its corresponding type fromthe following list.

Sample List : datalist = [1452, 11.23, 1+2j, True, 'w3resource', (0, -1), [5, 12], {"class":'V', "section":'A'}]

5. Write a Python program that prints all the numbers from 0 to 6 except 3 and 6.Note : Use 'continue' statement.
6. Write a Python program which iterates the integers from 1 to 50. For multiplesof three print "Fizz" instead of the number and for the multiples of five print "Buzz". For numbers which are multiples of both three and five print "FizzBuzz".
7. Write a Python program to find numbers between 100 and 400 (both included)where each digit of a number is an even number. The numbers obtained should be printed in a comma-separated sequence.
8. Write a Python program to create the multiplication table (from 1 to 10) of anumber.
9. Find the sum of series:
   a. 1 + 1/2 + 1/3 + ….. + 1/N
   b. 1 + x^2/2 + x^3/3 + … x^n/n
10. Classify the given number is prime or composite number.

G. Programming using Functions

1) Write a user-defined function to read the marks of 5 subjects, compute the total marks scored, average, and grade of the student. The function should take the name and ID of the student as arguments and print student name, ID, total, average, and grade. Write a Python program to print the mark details for *N* students using the function.

2) Write a function *power(X,N)* that will allow a floating-point number to be raised to an integer power and return the result. i.e. $Y = X^N$. Write a Python program to invoke the function.

3) Define a function *CheckOddEven(num)* that checks if the num is odd or even; the function sets a flag accordingly and returns it. Use this function to find the sum of even and odd numbers separately, from a given input of *N* numbers.

4) Define a function to find the factors of the given number as an argument. If the number is not given, then display the factors of the default argument.

5) Modify the function in Qn. (1) so that it returns total marks, average and grade of a student.

H. Programming using Recursive Functions

Write algorithms for the following problems and implement them.

1) Calculate factorial of a given number using recursive function. The base case should handle the negative integers by printing an error message and returns none to indicate that something went wrong.

2) Compute the sum of the digits of a given number using recursion.

3) Check whether a given number is prime or not using recursive function.

4) The greatest common divisor (GCD) of *a* and *b* is the largest number that divides both of them with no remainder. One way to find the GCD of two numbers is based on the observation that if *r* is the remainderwhen *a* is divided by *b*, then *gcd(a, b) = gcd(b, r).* As a base case, we can use *gcd(a, 0) = a.* Write arecursive function called *gcd* that takes parameters *a* and *b* and returns their greatest common divisor.

5) The Ackermann function, *A(m, n)* is defined as follows:

$$A(m,n) = \begin{cases} n+1 & \text{if } m=0 \\ A(m-1,1) & \text{if } m>0 \text{ and } n=0 \\ A(m-1,A(m,n-1)) & \text{if } m>0 \text{ and } n>0 \end{cases}$$

where m and n are non-negative integers

Solve the above problem recursively for different values of *m* and n.

I. Programming using Strings

1) Define a function to count the number of occurrences of a substring in a given string and print the starting index of the substring for each occurrence.

2) Encrypt a given message by "rotating" each letter by a fixed number of places. To rotate a letter meansto shift it through the alphabet, wrapping around to the beginning if necessary, so 'A' rotated by 3 is 'D' and 'Z' rotated by 1 is 'A'. Write a function called rotate_word that takes a string and an integer as parameters, and returns a new string that contains the letters from the original string rotated by the given amount. *E.g Given String: HAL Encrypted String: JCN (Rotated by 2)*

3) Write a user-defined function to check whether a given text is palindrome or not using string slice method.

4) Write a function *strip_characters(str,chars)* which removes the characters mentioned in *chars* from the string *str*. *E.g strip_characters('The quick brown fox jumps over the lazy dog','aeiou') outputs 'Th qck brwn fx jmps'*

J. Programming using Lists and Tuples

Write algorithms for the following problems and implement them.

1) Read a list of elements from the user and perform the following operations using functions: *search(key):* to find the given key in the list and display the position of the key if found, otherwise display appropriate message, *maximum(Lst)* and *minimum(Lst)* to find the maximum and minimum number respectively from the list.

2) Two words are anagrams if you can rearrange the letters from one word to spell the other. Write a function called *is_anagram* that takes two strings and returns *True* if they are anagrams. Test for the following examples:

School master = The
classroom Listen = Silent
A gentleman = Elegant man

3) Write a function *sorted* that takes a list as a parameter and sort the elements in lexicographical order. Test the function for a list of names and print the sorted list.

4) A list of students registered for Python course. Perform the following operations (use inbuilt functions) and print the output:

i. A new student registered for the course.
ii. Count the number of students registered for the course.
iii. Modify a name in the list.
iv. Sort the name list.
v. Insert a new student name in a given position.
vi. Search for a student.
vii. Remove a given name from the list.

5) Consider a tuple as T = (1, 3, 2, 4, 6, 5). Write a program to store numbers present at odd index into a new tuple.

6) Consider a list containing food items. Another list contains its corresponding price. Create these twolists by getting the input from user. Now get the items ordered by the customer in a tuple. Display thetotal cost of the ordered food.

Example:

Available Fruits: Oranges, Mangoes, Apple, Grapes,
PapayaPrice per Kg: 60, 80, 220, 80, 90
Your order (in Kgs): 2, 0, 1, 0,
0.500Total Amount: Rs. 385

K. Programming using Nested Lists

Write algorithms for the following problems and implement them.

1) Matrix is a rectangular array of data or numbers. The horizontal entries in a matrix are called as 'rows' while the vertical entries are called as 'columns'. If a matrix has *r* number of rows and *c* number of columns, then the order of matrix is given by *r X c*. Get the values of *r* and *c* from the user. Write a function to create and return the *r X c* matrix with the user input. Write another function to print the sums of each row.

2) Find the transpose of a given matrix using list comprehension.

3) For two matrices *A* and *B*, compute *A+B* and *A*B*. Show your answer with and without list comprehension.

L. Programming using Dictionary

Write algorithms for the following problems and implement them.

1) Write a user-defined function to print and store squares of numbers for the given range into a dictionary. *Example: For range 2 to N (both inclusive): If N = 5, the contents of the dictionary would be*
{2: 4, 3: 9, 4: 16, 5: 25}

2) Write a function named *reverseLookup* that finds all of the keys in a dictionary that map to a specific value. The function will take the dictionary and the value to search as arguments. It will return a (possibly empty) list of keys from the dictionary that map to the provided value. Show that the *reverseLookup* function works correctly when it returns multiple keys, a single key, or no keys.

Consider a dictionary mapping four French words to their English equivalents:
FrEn={'le':'the', 'la':'the', 'livre':'book', 'pomme':'apple'}

Expected output:
The french word for 'the' =
['le','la'] The french word for
'apple' = ['pomme']The french
word for 'food' = [ ]

3) Create a new dictionary by combining two dictionaries whose key-value pairs are given.
The newdictionary has to be created by adding values for common keys from the two dictionaries.

Dict1 = {'A': 100, 'B': 200, 'C':300}
Dict2 = {'A': 300, 'B': 500, 'D':400}
Sample output: NewDict = {'A': 400, 'B': 700, 'C': 300, 'D': 400}

4) In the game of Scrabble, each letter has points associated with it. The total score of a word is the sumof the scores of its letters. More common letters are worth fewer points while less common letters are worth more points. The points associated with each letter are shown below:

One point	A, E, I, L, N, O, R, S, T and U
Two points	D and G
Three points	B, C, M and P
Four points	F, H, V, W and Y
Five points	K
Eight points	J and X
Ten points	Q and Z

Write a program that computes and displays the Scrabble score for a word. *Hint: Create a dictionary thatmaps letters to points. Use the dictionary to compute the score.*

M. Files and Command Line Arguments

Write algorithms for the following problems and implement them.

1) Develop a program to write lines of text to a file from the user input and print the longest word fromthe file.

2) Initialize a List of sentences and write those sentences to a text file. Let each sentence be in a new

linein the text file.

3) Create a text file that contains atleast two paragraphs. Write a user-defined function to count the wordsin the text file those are ending with alphabet 'e'. Input the text filename as command line argument.

4) Write a program to input a set of integers (atleast 5 numbers) as command line arguments and find thesum of odd integers.