Assignment-01
IT602: OOPs and Data Structure

Instructions:

1. Understand problem; inputs and outputs
2. Write solution in English “pseudo-code”
3. Write code in a programming language (in C)
4. Compile, Run and test

Q1. In a company an employee is paid as under: Along with the basic salary, the employee would be given dearness allowance of 40% of his basic salary and house rent allowance of 20% of his basic salary. If the basic salary of an employee is received as input, write a program to find his/her gross salary.

Input:
The input for the code contains the basic salary of the employee.
Output:
Output the gross salary.

Example
Input:
1203
Output:
1924.800049

Q2. A student enters his/her marks of 5 subjects in a program. Assume that the maximum marks that can be obtained by a student in each subject to be 100. Write a program to calculate the aggregate marks of the student. Also, calculate the percentage marks obtained by the student.

Input:
Marks of 5 Subjects separated by spaces.
Output:
Aggregate Marks on the first line.
Percentage on the second line.

Example:
Input:
60 76 88 68 90
Output:
Total: 382
Percentage: 76.40002

Q3. Write a function that returns true if its string parameter is a palindrome (and false otherwise). A palindrome is a string that reads the same backwards or forwards, e.g. "Madam, I'm Adam." Actually, this string would fail the test because it contains white space and punctuation. With parameter "madamimadam", the function would return true.

Q4. Write a function that returns its string parameter but with punctuation and spaces removed and letters turned into lower case. Now if you call your function from problem 1 with the output of this new function, "Madam, I'm Adam." would pass the test.

Q5. Compute the median of a one-dimensional array x containing integers, or count the number of zeros in x (each of these actions would be a separate method, returning an integer value). Compute the mean as a floating point number.

Q6. Given integers b and c, compute b/c as an integer (rounded to the nearest integer). That is, round down if the remainder is less than 1/2, and up if the remainder is 1/2 or more. The value returned by the method should be an integer, not a floating point number. Count the number of zeroes in a rectangular matrix y. For a square array square, determine whether all the diagonal elements have the same value.

Q7. Amicable numbers are two different numbers so related that the sum of the proper divisors of each is equal to the other number. (A proper divisor of a number is a positive factor of that number other than the number itself. The proper divisors of 6 are 1, 2, and 3)

The numbers 220 and 284 are amicable numbers. Since the sum of proper divisors of 220 is equal to 284, and the sum of proper divisors of 284 is equal to 220. Write a program to check whether the entered numbers are amicable numbers or not.

Q8. A college offers a course that prepares student for the programming exam for C language. Last year, 10 of the students who completed this course took the programming examination. Naturally, the college wants to know how well his students did on the exam. You have to write a program to summarize the results. You have been given a list of 10 students. Next to each name a 1 is written if the student passed the exam and a 2 if the student failed.

Your program should analyze the results of the exam as follows:

a. Input each test result (i.e., a 1 or a 2). Display the prompting message "Enter result" each time the program requests another test result.
b. Count the number of test results of each type and display a summary of the test results indicating the number of students who passed the number who failed.
c. If more than eight students passed the exam, print the message "Yes".

Input:
Enter result (1= pass, 2 = fail): 1
Enter result (1= pass, 2 = fail): 2
Enter result (1= pass, 2 = fail): 2
Enter result (1= pass, 2 = fail): 2
Enter result (1= pass, 2 = fail): 1
Enter result (1= pass, 2 = fail): 1
Enter result (1= pass, 2 = fail): 1
Enter result (1= pass, 2 = fail): 2
Enter result (1= pass, 2 = fail): 1
Enter result (1= pass, 2 = fail): 1

Output:
Passed: 6
Failed: 4
No

Input:
Enter result (1= pass, 2 = fail): 1
Enter result (1= pass, 2 = fail): 2
Enter result (1= pass, 2 = fail): 1
Enter result (1= pass, 2 = fail): 1
Enter result (1= pass, 2 = fail): 1
Enter result (1= pass, 2 = fail): 1
Enter result (1= pass, 2 = fail): 1
Enter result (1= pass, 2 = fail): 2
Enter result (1= pass, 2 = fail): 1

Enter result (1= pass, 2 = fail): 1

Output:
Passed: 8
Failed: 2
YES

Q9. Bob wanted to design a program that identifies what the input character is. Write a program using switch case, which takes a character as an input and checks whether it is a vowel or consonant.

Input: single character (in uppercase or lowercase)
U or u
X or x

Output:
Vowel
Consonant

Q10. Consider an integer array 'a' of size 10, where the value of the array elements are {1,5,4,8,9,2,0,6,11,7}. Write a program to

a. Find whether the given element exists in an array or not. If the element exists in an array, display YES else NO.
b. To print a number following a sequence of elements in an array i.e., 15489206117.

Input:
5

Output:
YES
15489206117

Q11. Write a program to find how many times character appears in the given string and print it in the same order of their occurrences using function (All characters are in lower case).

INPUT: hello boy (there might be a space in string)
OUTPUT: b 1
e 1
h 1
l 2
o 2
y 1

Q12. Write a C program to count the occurrence of a substring in string.

INPUT: abcdgbcdvrbcd (string) (no space in string)
bcd (substring)
OUTPUT: bcd occurs 3 times

Q13. Write a program to find the factorial of the given number using recursion

Input:
5
Output:

Q14. Recursion Blast

Consider a sequence of the dependent channel of recursions taking place. Given a two string inputs perform the following set of operations over these strings.

Input:
Original string i.e. String 1.
Sequence of letters i.e. String 2

Operations:

a. Reverse the original string i.e. String 1.
b. Determine whether the occurrence of letters in given String 2 matches with the occurrence of the letters of the reverse string that is generated in part A. It displays GOOGLE else YAHOO. [String2 need not be necessarily a substring of the reversed string].
c. Calculate the value for the string length of reversed string raised to the string length of String2. [Implement Recursion Program for the Power function]

Condition: If Part B displays GOOGLE, perform Part D else Part E.

d. Generate the list of prime numbers till the value generated as an output in part C.
e. Generate the Fibonacci series till the value generated as an output in part C.

Sample Input:
abcd
cx

Sample Output:
dcba
YAHOO
16
0 1 1 2 3 5 8 13

Q15. Write a program to print the following type of pattern for given value of n.
Input:
3
Output:
 1
121
12321
Input:
5
Output:
 1
 121
 12321
1234321
123454321