International Meta Science University
Computer Science Education
2023-2024 Fall
C++ Programming Language Home Work Questions

Deadline: 22.12.2023
You should upload to your GitHub.

1. Make a program that calculate the factorial for given number (Verilen sayının faktoriyelini hesaplayan programı yapınız)
2. Make a program that find sum of the even numbers between given n numbers (Girilen n sayıdan çift olanlarının toplamını bulan programı yapınız)
3. Make a program that find given number is a prime number or not (Girilen sayının asal sayı olup olmadığını bulan programı yapınız.)
   a. **Prime number :** A **prime number** (or a **prime**) is a natural number greater than 1 that has no positive divisors other than 1 and itself. Like 2, 3, 5, 7, 9, 11, 13, 17…
   b. **Asal Sayı:** 1 den büyük ve sadece kendisine ve 1'e bölünebilen sayılara **asal sayılar** denir. 2, 3, 5, 7, 9, 11, 13, 17...
4. Make a program that find given number is a perfect number or not (Girilen sayının mükemmel sayı olup olmadığını bulan programı yapınız.)

   Perfect Number : In number theory, a **perfect number** is a positive integer that is equal to the sum of its proper positive divisors, that is, the sum of its positive divisors excluding the number itself (also known as its aliquot sum)

   Mükemmel Sayı: 6, 28 ,496 gibi kendisi hariç bütün pozitif çarpanları toplamı kendisine eşit olan sayılara denir. Örnek: 1+2+3=6
5. Make a program that find (calculate)given base for fiven number. (Girilen bir sayıyı girilen tabana çeviren programı yapınız.)

   Given number: 65

   Given base: 2

   Output: 1000001

   - In mathematical numeral systems, the **radix** or **base** is the number of unique digits, including zero, that a positional numeral system uses to represent numbers.
   - For example, for the decimal system (the most common system in use today) the radix is ten, because it uses the ten digits from 0 through 9. In any numeral system (except unary, where radix is 1), the base will always be written as $(x)_y$. For example, $(10)_{10}$ represents the number ten in the decimal system; $(10)_2$ represents the number two in a base two system.

6. Make a program that find sum of digits for given number (Klavyeden girilen bir sayının basamaklarının toplamını ekrana yazdıran programı yapınız.)

Example:
Input: 34 => 3+4 = 7
Output: 7

Input: 367 => 2+6+7=16
Output: 16

Input: 234573 => 2+3+4+5+7+3=24
Output: 24

7. Make a program that write the given number in the form of text. (Klavyeden girilecek 0 ile 999 arasında bir tam sayının, yazıyla yazan programı yapınız)

Example:
Enter Number : 49
Output: Forty Nine

8. Make a program that produces the following figure according to the number n entered on the screen. (Nested loops)(Ekrana girilen n sayısına göre aşağıdaki şekli çıkaran programı yapınız.(İç içe döngüler))

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

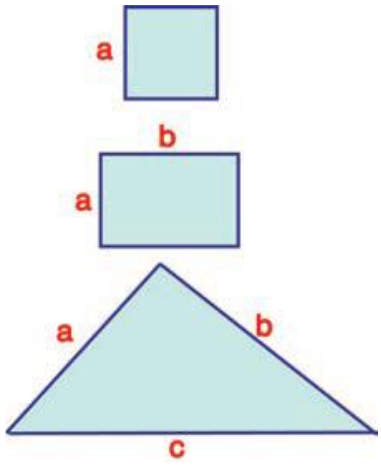
9. Make a program that produces the following figure according to the number n entered on the screen. (Nested loops)(Ekrana girilen n sayısına göre aşağıdaki şekli çıkaran programı yapınız.(İç içe döngüler))

```
1
22
333
4444
55555
```

10. Make a program that produces the following figure according to the number n entered on the screen. (Nested loops)(Ekrana girilen n sayısına göre aşağıdaki şekli çıkaran programı yapınız.(İç içe döngüler))

```
1
12
123
1234
12345
1234
123
12
1
```

11. Make a program to calculate the area of a square, rectangle, and triangle. Make three different functions with the same name to calculate the areas. The area function to calculate area of a square should take single integer parameter, and return an integer value. The area function to calculate area of a rectangle should take two integer parameters and return an integer value. The area function to calculate area of a triangle should take three integer parameters and return a double value.



12. PRIME PALINDROMES

The number 151 is a prime palindrome because it is both a prime number and a palindrome (it is the same number when read forward as backward). Write a program that finds all prime palindromes between two numbers a and b. You may assume that a and b are between 1 and 32,000.

Test your program with a,b =1000, 32000
Test Case 1
a,b = 10000, 32000
PRIME PALINDROMES BETWEEN 10000 AND 32000
10301 10501 10601 11311 11411 12421 12721 12821 13331 13831 13931
14341 14741 15451 15551 16061 16361 16561 16661 17471 17971 18181
18481 19391 19891 19991 30103 30203 30403 30703 30803 31013 31513*)

13. A number consists of only 1 as a digit, like 111111. But we don't know how many digits it has. We only know that it can be divisible by 1991. Find out how many digits it has.

14. Write a program that asks for a number n then searches the numbers from 1 to n if the sum of its digits' mth power (where m is the number of digits that the number has) is equal to itself.
For Example:
$371=3^3+7^3+1^3$
$9474=9^4+4^4+7^4+4^4$
Here first we take 3^{rd} power of each digit because 371 has three digits then we take 4^{th} power of each digit because 9474 has four digits
Write a program that finds the numbers which are similar to this rule

15. Make a program that output will be given below (Aşağıdaki şekilde output veren programı yapınız.)

1	2	3	4	5	6	7	8	9	10
2	4	6	8	10	12	14	16	18	20
3	6	9	12	15	18	21	24	27	30
4	8	12	16	20	24	28	32	36	40
5	10	15	20	25	30	35	40	45	50
6	12	18	24	30	36	42	48	54	60
7	14	21	28	35	42	49	56	63	70
8	16	24	32	40	48	56	64	72	80
9	18	27	36	45	54	63	72	81	90
10	20	30	40	50	60	70	80	90	100

16. Write an algorithm that can read numbers from keyboard. If the entered number is equal to previous number , program will be stopped and displayed the total entered numbers otherwise program will continue. See the following test.

TEST 1	TEST 2	TEST 3
Enter numbers 4 6 123 67 32 98 98 You've entered 7 numbers	Enter numbers 5 5 You've entered 2 Numbers	Enter numbers 6 7 8 4 3 1 45 67 67 You've entered 9 numbers

17. Write an algorithm that can display all the numbers which digits of number are different. Your algorithm must work between 10 to 1000

Test

10	20	98
12	21	102
13	23	103
14	24	104
15	...	...
...	...	...
...	...	987

18. Write a password program, that uses if then else.

19. Calculate the given expression $\sum_{i=1}^{n} i + \frac{n-1}{i!}$

20. Calculate the given expression $\sum_{i=1}^{n} \frac{1}{i!} + \frac{i}{(n-i)!}$

21. Two dies Rolling n times. How many times they will be same value

22. Implement the program which reads a character from the user as the indication of color of the traffic light, and send a comment to the user. (Trafik işığı kurallarına göre, rengin baş harfi girildiğinde yapılması gerekeni bildiren programı yapınız)

Input : A character indicating color of light ('r','y','g').

Output : "WAIT", "GET READY", "GO" or "WRONG INPUT".

PS: For character type use “char” type. (Karakter girişi için char tipini kullanmanız gerekir)

23. A train leaves the first station with N passengers and visits K stations before it arrives at the last station. In each station some passengers got off the train and some passengers got on the train. Everybody in the train got off at the last station. Make a program that calculates how many passengers got off the train at the last station.

The first line of the input has two integers N and K. Each of the following K lines contains two integers, the first one denotes the number of passengers who got off the train at that station, and the second one denotes the number of passengers got on the train at that station. The output should hava a single integer that is number of passengers who got off the train at the last station.

Using files

Input file: train.txt

output file: trainout.txt

Sample input	Sample output
5 20	40

5 How many stations;
20 starting number for passengers)

Got off	Got on
6	15
5	30
20	12
15	8
6	7

train.txt

```
5  20
6  15
5  30
20 12
15  8
6   7
```

trainout.txt

```
40
```

24. We have lottery ticket numbers between 000000 to 999999. For lottery ticket number, if sum of even digits is equal to odd digit numbers that lottery ticket is lucky. How many lucky lottery tickets will be? (000000 dan 999999 ya kadar piyango bilet numaraları vardır. Tek basamakların toplamı çift basamakların toplamına eşit biletler şanslı biletlerdir. Kaç tane şanslı bilet vardır?)

Example:

```
123321 => even digits: 1-3-2  => odd digits: 2-3-1
1+3+2=2+3+1=> 6=6
```

25. Write a program in C# Sharp to count a total number of alphabets, digits and special characters in a string. (Don' use build-in function)

Test Data :

Input the string : Welcome to Lexicon-1

Expected Output :

```
Number of Alphabets in the string is : 20
Number of Digits in the string is : 1
Number of Special characters in the string is : 3
```

26. Write a program in C# Sharp to find maximum occurring character in a string.

Test Data :

Input the string : Welcome to w3resource.com.

Expected Output :

```
The Highest frequency of character 'e' appears number of
times : 4
```

27. Write a program in C++ to read a string through the keyboard and sort it but don't use Sort method. (You need to write code for it)

Test Data :

Input number of strings :3

Input 3 strings below :

abcd

zxcv

mnop

Expected Output :

```
After sorting the array appears like :
abcd
mnop
zxcv
```

28. Random NumberWrite a program randomsum generating and printing the sum of n random numbers in the interval [1,100].

For example:
5 random numbers: 78 13 91 2 36
The sum is 222

29. Classify Numbers

Write a program oddpositive which generates a random number in the interval [-10,10] and classifies it as odd/even and as positive/negative.

For example:

The generated number is -7
-7 is odd and negative

30. Write a program random_numbers that reads a positive integer N from the keyboard and then:

-Generates and prints (in a single line) N random numbers in the interval [1,100]

-Prints the average value, the smallest number (min), and the largest number (max).

An example of an execution:

Enter number of integers to be generated: 10
Generated values: 77 15 13 54 96 73 100 12 98 28
Average, min, and max are 56.6, 12, and 100

- A suitable error message should be presented if the input number **N** is non-positive.
- Find solution with your code not with build-in method.

31. Write a program two_dice that use the random to simulate that you are rolling two dice 1000 times. At the same time, keep track of the number of times you get the result (adding the dice values) 2, 3, ..., 11, 12. (Use an array to store a count of the numbers.) After the simulation, present the frequencies for the different numbers.

An example of an execution:

Frequency table (sum, count) for rolling two dices 1000 times:
2 - 267
3 - 555
4 - 833
5 - 1101
6 - 1346
7 - 1690
8 - 1399
9 - 1083
10 -862
11 -580
12 -284

Note: No input in this program. It should just present a randomly generated frequency table,

32. Short Name - Write a program shortname, reading a first name and a last name (given name and family name) as two strings. The output should consist of the first letter of the first name followed by a dot and a space, followed by the first four letters of the last name.

An example of an execution:

```
1.First name: John
2.Last name: Skywalker
3.Short name: J. Skyw
```

- What happens if the last name consists of less than four letters?