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Course Code: **CSE-1121** | Course Title: **Computer Programming I**

Assignment - 5

1. What will be the output of the following program?

```
int main()
{
        int i,j;
        for(i = 3; i >= 1; i--)
                for(j = 0; j <= i; j++)
                        printf("%d %d\n", i, j);
    return 0;
}
```

2. The following code prints the numbers from 1 to n.

```
for (i = 1; i <= n; i++)
        printf("%d\n", i);
```

Modify your code so that it prints the numbers from p to q but skips printing every number divisible by 3. You should use continue to accomplish this task. How the output will be changed if the continue statement is replaced with a break statement?

3. Given a range [a, b], write a C program to find the summation of all the odd integers which is divisible by 3 or 5 in this range. For example, the summation of all the odd integers which is divisible by 3 or 5 in the range [3,9] is 3+5+9=17.
Input: Enter two integers: 3 9
Output: Sum of all integers in the range is: 17

4. Write a C program for printing the following pattern for any N and d. You should print a blank a line if the line number is divisible by d. The given pattern is for N = 5 and d = 2.

```
  *

 ***

*****
```

5. Given two numbers A and B. Print all YID numbers between A and B inclusive. Note: The YID number is any positive number that its decimal representation contains only MN(last 2 digits of your id).
For example: If M=2 N=4 then 2, 24, 44, 22, 44 and are YID and numbers 5, 14 and 274 are not.
Take Input 4 numbers A,B, M,N. Print all YID numbers between A and B inclusive separated by a space. If there is no YID number print 0.

Sample Input	Sample output
1 30 2 4	2 4 22 24
5 20 2 4	0

6. Write a code segment to print the following pattern. If N=5 then output will be

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

7. What will be the output of the following program?

```
int main()
{
        int i,j;
        for(i = 0; i < 3; i++)
                for(j = 2; j >= 0; j--)
                        printf("%d %d\n", i, j);
```

```
    return 0;
}
```

8. What will be the output of the following code if a = 8 and n = 30? How the output will be changed if the continue statement is replaced with a break statement?

```
sum = 0;
for (i = a; i <= n; i = i+3)
{
        if (i % 5 == 0)
        {
                sum = 0;
                continue;
        }
        sum = sum + i;
        printf("sum = %d\n", sum);
}
```

9. Write code for printing the following pattern for any input N. The given pattern is for N = 3.

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

10. You will be given some positive integer inputs followed by a negative value. You have to print the sum of the given positive inputs except the ones which are divided by 3 or 5. You have to calculate their average also. Write a C program for this by using break statement after getting the negative input and continue statement if the input is divided by 3 or 5.

11. A prime number (or a prime) is a natural number greater than 1 that is not a product of two smaller natural numbers. Write a C program that will read a positive integer N and determine whether n is prime or not.

12. A Mersenne Number is a positive integer that is one less than a power of two. For example, the n-th Mersenne number, Mn. is: Mn = 2^n-1
A prime number is a positive integer that has exactly two distinct positive integer divisors, namely 1 and itself. The number 1 is, by definition, not a prime number. A Mersenne prime is a Mersenne number that is prime. The number 3 is the smallest Mersenne prime; because 3 is a prime number, and 2^2 -1=3. As of February 2014, 48 Mersenne primes are known. Write a complete C program that finds and prints the 5 smallest Mersenne prime, each by itself on a line. You may use any C math library functions in your solution.

13. Given three numbers N, A, B. Print the summation of the numbers between 1 and N whose sum of digits is between A and B inclusive.

Sample Input	Sample output
20 2 5	84
10 1 2	13

Explanation:
In the first simple:
Among the numbers 1 to 20, the numbers whose sums of digits are between 2 and 5, are: 2,3,4,5,11,12,13,14 and 20.
So, the answer is: 84.

14. Write the output of the following C code.

```
#include <stdio.h>
int main()
{  int rows = 5;
   for (int i = 1; i <= rows; i++)
   {
      for (int j = 1; j <= rows; j++)
         if (j <= i)
            printf("C");
      printf("\n");
   }
   return 0;
}
```

15. Write a C program that reads a positive integer N and prints the following pattern for n rows. For example, if N is 5, then the output would be:

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

16. Write a program in C to make such a pattern like right angle triangle with a number which will repeat a number in a row using the function. Assume that N will be input to your program.
The pattern like:

```
1
22
333
4444
……….
………
NNNNNN…N
```

17. You will be given some positive integer inputs followed by a negative value. You have to print the sum of the given positive inputs except the ones which are divided by 5 or 7. You have to calculate their average also. Write a C program for this by using break statement after getting the negative input and continue statement if the input is divided by 5 or 7.

Sample Input	Sample Output

5 6 2 8 7 8 -1	Sum = 24
	Average = 6.0

18. A prime number (or a prime) is a natural number greater than 1 that is not a product of two smaller natural numbers. In this problem, you will be given T test cases. Each test case consists of one line containing a single nonnegative integer N. For each test case, print Prime number if the number N is a prime number. Otherwise, print Not a prime number.

Sample Input	Sample Output
2 11 12	Prime number Not a prime number

19. What will be the output of the following program? Explain the output with all the calculations.

```
#include <stdio.h>
int a = 1, b = 2;
int funct2 (int a) {
return (b + a);
}
int funct1 (int  a) {
b = funct2 (a +  1) + 1;
return (b);
}
int main () {
  int c, a = 3;
  for (c = 1; c <= 5; ++c) {
          b += funct1(c + 1) + a;
          printf (“%d  “, b);
  }
  printf("\nAns = %d", b+a);
  return 0;
}
```

20. Consider the following program:

```
#include <stdio.h>
int fib(int n)

  if(n <= 1) return n;
  int ret = fib(n-1) + fib(n-2);
```

```
   return ret;
}
int main()
{
   int n = 3;
   printf("%d-th Fibonacci number: %d\n", n, fib(n));
   return 0;
}
```

I) What is the output of the code segment given above?
II) Explain how the recursion will be executed by drawing the recursion tree.

Or
Let a function F is defined as follows:

F(n, 0) = 1
F(n, n) = 1
F(n, k) = F(n-1, k-1) + F(n-1, k)

Write a recursive function to evaluate this function.

21. Write a function named divisorcheck that takes two integers x and y as the parameters and returns 1 if x divides y or y divides x. It returns 0 otherwise. Demonstrate your function in a complete program.

22. Write a function named oddcheck which takes two integers x and y as the parameters. The function returns 1.1 if both numbers are odd; 0.1 if one of the numbers is odd, and 2.0 if both numbers are even. Demonstrate your function in a complete program.

23. Write the first line of a function definition, including the formal argument declarations, for each of the situations described below:
   i) A function called process that accepts an integer and two floating point quantities (in that order) and returns a double precision quantity.
   ii) A function called drawCircle that accepts two integer parameters followed by a double precision value and returns nothing.

24. Consider the code fragment written in C below:

```
void rec(int n)
{
 if (n == 0)
   return;

 printf("%d", n%2);
 rec(n/2);
}
```

What does rec (2X) print? Explain.
[Here X is the last digit of your ID. If ID is C191085, 2X will be 25].

25. Write a function called multiple that determines for a pair of integers whether the second integer is a multiple of the first. The function should take two integer arguments and return 1 (true) if the second is a multiple of the first, and 0 (false) otherwise. Demonstrate your function in a complete program.

26. Write a function that takes a positive integer and returns the summation of all the factors (Excluding the 1 and the number itself) of that number. Demonstrate your function in a complete program. For example, if the input number is 10 then the output is 7.

27. Describe the output of the following program:

```
#include <stdio.h>
int a=0, b=1;
int funca (int a);
int funcb (int b);

main(){
        int count;
        for (count=1; count<=5; ++count){
           b+=funca(a+1)+1;
```

```
            printf ("%d", b);
        }
funca (int a){
            b = funcb (a+1)+1;
            return(b);
        }
funcb (int a){
              return(b+a);
        }
```

28. Write a program to find whether N is a super-prime or not.
Input: 7331 (is super prime) Input: 4550 (is not super prime)
Hint: 7331 is super-prime because, 7331, 733, 73 and 7 are primes

29. Write down the code snippet and fill out an NxN matrix to create the following pattern. Assume that N will be input to your program. For example, N=5 them the pattern will be.

```
0 -1 -1 -1 -1
1  0 -1 -1 -1
1  1  0 -1 -1
1  1  1  0 -1
1  1  1  1  0
```

30. Any number in the Fibonacci series is the summation of two previous number in the series. The first two numbers are predefined as 1, 1. The series can be shown as follows:
1, 1, 2, 3, 5, 6, 13, …

Write down a function checkFibonacci(n) which returns 1 if the parameter n is a Fibonacci number and 0 otherwise.

For example:
CheckFibonacci(8) should return 1,
CheckFibonacci(21) should return 1,
CheckFibonacci(7) should return 0.

31.

```
int magic (int n) {
   int m = 0;
   m += n;
   return m;
}

int main () {
   for (int i = 1; i <= 5; i++) {
      printf("%d ", magic (i));
   }
   return 0;
}
```

i) Write the output produced by the code snippet above.
ii) You're not allowed to make any changes in the main() function. Change the program so that it would output the cumulative sum from 1 to 5, i.e. it would output 1 3 6 10 15.

32. Write a program that will take a number of command line arguments. All arguments will be integer numbers. Your program will find the median and mode of those numbers. To find the median, the numbers have to be listed in numerically sorted order. Then the middle element is the median. For example, if the list is {4, 1, 1, 10, 3, 5, 7}, then first sorting in ascending order, we find the list as {1, 1, 3, 4, 5, 7, 10}. The median will be the 4-th element which is 4. Note that, if the number of elements in the list is even, then the average of two middle elements will be the median.

The mode is the number that is repeated more often than any other, so in the above list 1 is the mode. If there is no such number which appears maximum times, your program should print "No Mode".

33. Write a program that will pass an array through the arguments. Your defined function will sort those numbers in function. For example, if the array is {4, 1, 1, 10, 3, 5, 7}, then sorting in

ascending order, we find the array as {1, 1, 3, 4, 5, 7, 10}. Then return the array from the function to the main function and print the sorted array at main function.

34.

```
void shout (int n) {
   if (n <= 0) return;
   printf("%d ", n);
   shout (n / 2);
   printf("%d ", n);
}

int main () {
   int n = 5X;
   shout (n);
   return 0;
}
```

Write the output of the code snippet above where X is the last digit of your ID. For example, if your ID is C231227, then n = 5X = 57.

35. When passing an argument to a function, what are the differences between passing by value and passing by reference? Explain with a simple C program.

36. Initialize an array with your ID (Example: If your ID is C143256 and there is an array named A). After storing in the array, it will be look like
A[0] = 1 , A[1] = 4 , A[2] = 3 , A[3] = 2 , A[4] = 5 , A[5] = 6
Then write a code segment to print the ID in the following format
i = 0, A[0] = 1
i = 1, A[1] = 4
i = 2, A[2] = 3
i = 3, A[3] = 2
i = 4, A[4] = 5
i = 5, A[5] = 6

37. Write a C program to take N numbers as input and store them in an array. Then input another number X. Now, print all those numbers which are larger than X in a single line. In the next line, print all those numbers which are smaller than X.

Sample Input	Sample Output

5
8 4 7 6 2
6
	8 7
	4 2

38. Given an array of integers, write a C program to find if it contains a strictly increasing sequence of integers. In the following examples, 1, 4, 7, 9 is a strictly increasing sequence but 1, 4, 4, 7 or 1, 4, 7, 3 are not.

39. Given a number N and an array A of N numbers. Using recursion print the numbers in odd indices.

Sample Input	Sample output
4 1 4 2 7	1 2
7 1 5 8 2 3 9 11	1 8 3 11

40. Write a C program that takes an array of n numbers as input and considering the array as two halves, reverses each half. Here, n is an even integer.

Sample Input	Sample output
6 7 5 9 2 1 3	9 5 7 3 2 1
4 8 7 9 5	7 8 5 9

41. Declare an array of size 20 and initialize it with the digits of your ID. Next, write a C code segment to find the cumulative sum of the array of numbers and store those numbers in the same array. For example, if your ID is C143256 then the array contains {1,4,3,2,5,6} initially then after execution of your program it will contain {1,5, 8, 10, 15,21}.

42. You will be given a matrix of 5×5 dimension and an integer Q. Find the sum of the Q-th row and Q-th column.

Sample Input	Sample Output

1 2 3 4 5
7 8 4 5 6
9 8 7 6 5
5 4 3 2 1
1 3 5 7 9
3
	Row Sum = 35
	Col Sum = 22

43. Write a program that will print the sum of two diagonals of an n × n integer matrix.

44. Given a number N and an array A of N numbers. Determine if the array is good or not. The array is good if the frequency of the maximum element is even.

Sample Input	Sample output
5 7 7 9 5 9	Good
6 8 7 9 5 9 9	Bad

45. You are given the marks of N students, each student gave M subject in exam. Find who will be topper in exam and his ID number.Each row number represent their ID.

Sample Input	Sample output

5 4
90 80 70 60
95 85 60 75
75 55 75 79
65 85 87 37
84 72 64 70
	ID: 2 Total=315

46. Consider an array DATA with some integers. If the first element of DATA is odd, the last element of it should also be odd. On the other hand, if the first element of it is even, the last element should also be even. If the second element of DATA is odd, the second last element of it should also be odd. On the other hand, if the second element of it is even, the second last element should also be even. And so on. Such an array DATA is called qalindrome. For example, {2}, {3}, {1, 2, 3, 8, 5}, {1, 2, 4, 3} are qalindromes whereas {1, 1, 2}, {1, 6} are not. Given an integer N, and N number of more integers, write a C program to determine whether the array is qalindrome or not.

Sample Input	Sample Output
5 1 2 3 8 5	YES
3 1 1 2	NO

47. Given a number N and an array A of N numbers. Determine if it's palindrome or not. An array is called palindrome if it reads the same backward and forward, for example, arrays { 1 } and { 1,2,3,2,1 } are palindromes, while arrays { 1,12 } and { 4,7,5,4 } are not.

48. You're given an array A of size N ×M, and an integer S. You have to find out how many column's summation of A equal to S.

Sample Input	Sample Output

3 4 10
1 1 6 1
4 1 2 1
5 1 2 1
	2

In this example, the size of array A is 3 ×4, S = 10. Only the first (1 + 4 + 5) and the third column (6 + 2 + 2) sum equal to S (10). So, the answer is 2.