Lab Sheet – V & VI

Functions and Recursion

Write these programs to your record book

2, 4, 8, 9, 10, 12, 13, 15 to18, 20 to 28

1. Write a program to define a function sum ( ) that takes two integer arguments and return the result to the calling function.
2. Write a function swap ( ) that takes two arguments and swaps the values. Using a function, return the second largest among three numbers.
3. Write a program to find the largest digit in a number. Use a function that takes an integer number as an argument.
4. Write a program to print the sum of 1+2+3+…+n. Use a function with limit as the argument.
5. Write a program that accepts three numbers and using a function returns the largest among the numbers.
6. Write a program that reads a number and finds the factorial using a function that takes an integer number.
7. Write a menu driven program with the following options:-
   - Add
   - Difference
   - Product
   - Division

   Use functions for each of the menu with proper arguments, return type and function name.

8. Write a menu driven program with the following menus:-
   - Area of circle
   - Perimeter of circle
   - Area of rectangle
   - Perimeter of a rectangle

   Use functions for each of the menu with proper arguments, return type and function name.

9. Write a program to find the sum of series 1/1! + 4/2! + 27/3! +… …. Using functions, find the sum of the series.
10. Write a function to calculate compound interest given the principal, rate of interest and number of years.
11. Write a function to print the first *n* terms of the Fibonacci series.
12. Write a function to print the non-Fibonacci series until *n*. For example if n is 10 your program should display 4, 6, 7, 9, 10. Do not use arrays in the program.
13. Print the prime factors of a given number using a function.
14. Write a C program that does the following.
    - It asks the user to enter an integer between 100 and 9999.

- If the entered number is out of range, the program ask the user to enter a valid number.
- Then the program prints the digits in words of the number on separate lines. Here is an example

> Enter an integer between 100 and 9999: 99
>
> Invalid Input
>
> Enter an integer between 100 and 9999: 987
>
> Seven Eight Nine

15. The following types of chocolates are available in a chocolate shop. Write a menu driven program to display the chocolate type, price and discount. Get the customer's choice and the number of chocolates required. Assume that each customer can buy only one type of chocolate. Use switch case to calculate the total amount with discount for each customer and display it. Use a function to calculate total amount. Also keep track of how many of each type of chocolate was sold throughout the day and print it using a function.

Sl.no	Chocolate Type	Price (Rs.)	Discount (%)
1	White Chocolate	50	10
2	Dark Chocolate	60	12
3	Raw Chocolate	42	6
4	Bittersweet Chocolate	55	8

16. Write a function to print the first n terms of the following series:

$$1, 2, 4, 8, 16, 22, 26, 38, 62, 74, 102, 104, 108, 116, 122, 126, 138 \ldots.$$

Hint: To get each term in the above series you have to multiply all the non-zero digits of previous number and then add that value to previous number. Thus with a value like 62, you multiply 6 x 2 and get 12. Now $62 + 12 = 74$, which is the next value in the sequence?

17. Write a function to print the numbers in a given range whose sum of the factorials of its digits is equal to the number itself.

> For example: $145 = 1! + 4! + 5! = 1 + 24 + 120 = 145$

18. Write a C program to find HCF of two numbers

Hint: HCF (Highest Common Factor) is the greatest number that divides exactly two or more numbers. HCF is also known as GCD (Greatest Common Divisor) or GCF (Greatest Common Factor).

Common factors of 12 and 30
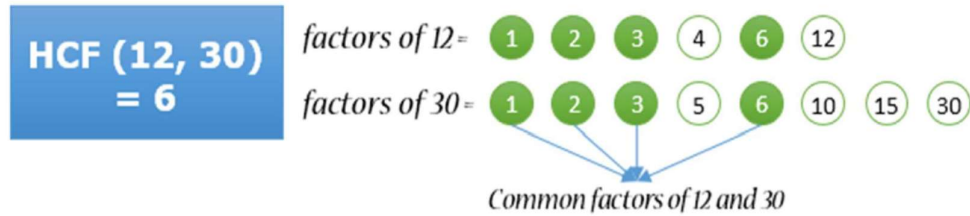
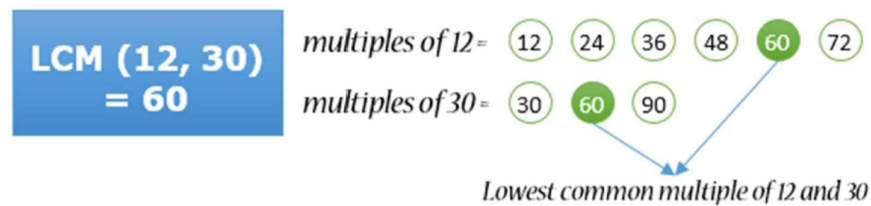19. Write a C program to find LCM of two numbers

Example

Input

Input first number: 12

Input second number: 30

Output

LCM of 12 and 30: 6

Hint: LCM is a smallest positive integer that exactly divides two or more numbers.

Lowest common multiple of 12 and 30

20. Write a C program to find the two's complement of a number using functions.

Hint: 2s complement of an N-bit number is defined as the complement with respect to 2^N. It is the result of subtracting the number from 2^N, which in binary is one followed by N zeroes. In simple words 2s complement is defined as sum of ones complement of a binary number and 1.
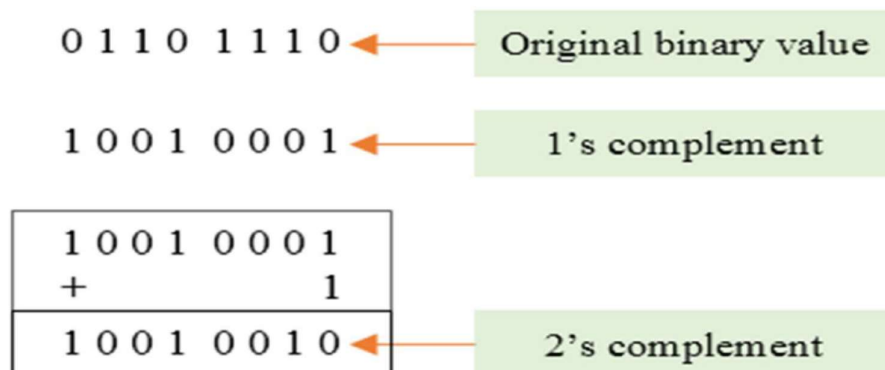
Recursion

21. Write a C Program to find factorial of a number using a recursive function
22. Write a C Program to find gcd of a number using a recursive function.
23. Write a C Program to find product of two numbers using a recursive function.
24. Write a C Program to find power of a number using a recursive function.
25. Write a C Program to find the nth Fibonacci number using a recursive function.
26. Write a C Program to convert a decimal number to its binary equivalent using a recursive function.
27. Define a recursive function for reversing a number and to find sum of digits of a number
28. A child is running up a ladder with *n* steps, and can hop either 1 step or 2 steps at a time. Calculate how many possible ways the child can run up the ladder.