Practice problems:

Common problems

1. Write a recursive implementation of the factorial function. Recall that $n! = 1 \times 2 \times \ldots \times n$, with the special case that $0! = 1$.

2. Write a recursive program to calculate the power of x (x^y), where y is a non-negative integer.

3. Write a recursive program to print the n^{th} Fibonacci number.

4. Write a recursive program to check if a given string is a palindrome or not (not case sensitive, ignore whitespaces)

Sample input	**Sample output**
Evil olive	True
Too bad	False

Numbers

5. Write a recursive program to print the even numbers in a given range.

Sample input	**Sample output**
3 10	4 6 8 10

1D array:

6. Write a recursive program to print an array of size n in given order.

7. Write a recursive program to print an array of size n in reverse order.

8. Write a recursive program to find the sum of the elements of an array of size n.

9. Write a recursive program to find the products of the elements of an array of size n.

10. Write a recursive program to find the maximum of the elements of an array of size n.

11. Write a recursive program to find the minimum of the elements of an array of size n

12. Write a recursive program to find the average of the elements of an array of size n

13. Write a recursive program to print the odd/even numbers of an array of n integers

14. Write a recursive program to print the prime numbers of an array of n integers

15. Write a recursive program to count the odd/even numbers of an array of n integers

16. Write a recursive program to count the prime numbers of an array of n integers

2D array

17. Write a recursive program to find the maximum of a 2d array.
18. Write a recursive program to count the prime numbers of a given 2d array.

Series

19. Find the sum of the following series up to n^{th} position / Print the following series up to n^{th} position.
    - $1 + 2 + 3 + \ldots$
    - $1^2 + 2^2 + 3^2 + \ldots$
    - $1 * 3 + 2 * 5 + 3 * 7 + 4 * 9 + \ldots$
    - $2 * 3 + 4 * 5 + 8 * 7 + 16 * 9 + \ldots$
    - $2 * 3 * 4 + 4 * 5 * 3 + 8 * 7 * 2 + 16 * 9 * 1 + \ldots$

GCD/LCM

20. Write a recursive program to find the GCD of x and y where x, y are positive integers. (Hint: use Euclid's algorithm. Two ways to solve this.)
21. Write a recursive program to find the LCM of x and y where x, y are positive integers. (Two ways to solve this)

Digits

22. Write a recursive program to count the number of digits of an integer.
23. Write a recursive program to find the sum of digits of an integer.
24. Write a recursive program to check if a given positive integer is a palindrome or not. An integer is a palindrome when it reads the same backward as forward.
    - Try solving it here.

Subset

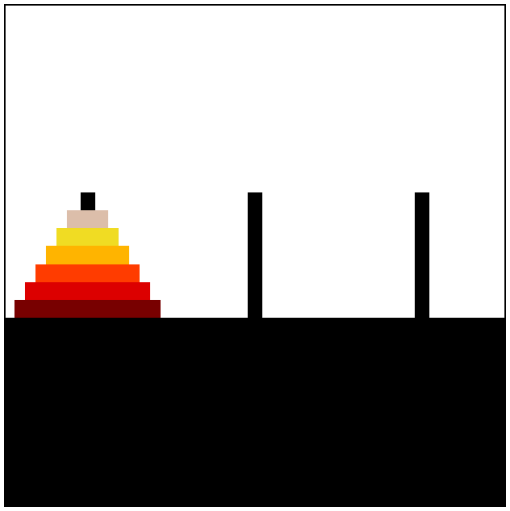
25. Write a recursive program to print all subsets of a set of n elements.
26. Write a recursive program to print all subsequences of a string.

Miscellaneous:

27. Write a recursive implementation of binary search in a sorted array.
28. Given a set of parentheses check if they are balanced or not using a recursive function.
29. Implement DFS using recursion to traverse a graph.
30. Implement in-order, preorder and postorder traversal of a graph using recursion.

31. Print the path from a node to the root of a binary tree using recursion.

32. Write a recursive program to solve the Tower of Hanoi problem for n disks.



Sample input	Sample output
4	Move disk 1 from A to B Move disk 2 from A to C Move disk 1 from B to C Move disk 3 from A to B Move disk 1 from C to A Move disk 2 from C to B Move disk 1 from A to B Move disk 4 from A to C Move disk 1 from B to C Move disk 2 from B to A Move disk 1 from C to A Move disk 3 from B to C Move disk 1 from A to B Move disk 2 from A to C Move disk 1 from B to C