

Practice Problems – Loops and 1D array (2nd Batch)

1. Determine whether a number is a perfect number or not. A number is a perfect number if the sum of its factors is twice the number. For example, 28 is a perfect number as the sum of its factors (1, 2, 4, 7, 14, 28) is 56 which is twice of 28.
2. Determine whether a number is an Armstrong number or not. Armstrong number is a number that is equal to the sum of cubes of its digits. For example, 153 is an Armstrong number as $1^3 + 5^3 + 3^3 = 153$.
3. Determine whether a number is palindrome or not without using an array. For example, 1221 is a palindrome number but 1232 is not a palindrome number.
[Hint: Find the individual digits in reverse order and try to recalculate the original number. You might need to use $\text{pow}(a, b)$ function under `<math.h>` library to calculate a^b]
4. Determine whether a number is a Harshad number or not. A number that is divisible by the sum of its own digits is a Harshad number. For example, 1729 is a Harshad number because $1 + 7 + 2 + 9 = 19$ and $1729 = 19 \times 91$.
5. Write C programs to print the following patterns using loop:

i.

```

      A
     ABC
    ABCDE
   ABCDEFG
  
```

ii. [Pascal's Triangle]

```

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

iii.

```

55555
4444
333
22
1
  
```

6. Write a C program to generate all the Pythagorean triplets in the range 1 to 1000. For example, 6-8-10 is a Pythagorean triplet as $6^2 + 8^2 = 10^2$
7. Write a program without using array to calculate the sum of the Fibonacci sequence up to n-th term.
8. Write a program to calculate n_{cr} and n_{pr} . Your program should handle the edge case of n should be greater or equal to r .
9. Write a program that will calculate following mathematical function for the input of x . Use only the series to solve the problem.

$$\text{Sinx} = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \dots \dots \dots \infty$$

10. Write program to find the sum of the digits of a number until single digit.
For input 9298, first add all the digits to find $9 + 2 + 9 + 8 = 28$. Now, 28 is still not single digit, so add the digits again to find $2 + 8 = 10$. 10 is still not a single digit, so add $1 + 0 = 1$. Your program should stop at 1 as it is a single digit.
You can see another example, $7959 \rightarrow 30 \rightarrow 3$.

11. Write a program to find binary of a decimal number. For example, binary of decimal 10 is 1010. Binary of 14 is 1110.
12. Determine whether two given numbers are anagram or not. Anagram numbers will consist of same digits. For example, 1321 and 3211 are anagrams. Similarly, 4209 and 9024 are anagrams.
[Hint: Use two arrays of counters and determine whether the arrays are identical or not].

13. Write a program to insert a number at the beginning of an existing array.

Example:

5	10	2	8	1	8	3
---	----	---	---	---	---	---

I want to add 7 at the beginning, the resultant array should be:

7	5	10	2	8	1	8	3
---	---	----	---	---	---	---	---

14. Write a program to insert a number at any position of an existing array.

Example:

5	10	2	8	1	8	3
---	----	---	---	---	---	---

I want to add 7 at position 5, the resultant array should be:

5	10	2	8	1	7	8	3
---	----	---	---	---	---	---	---

15. Write a program to delete the first element of an array.
16. Write a program to delete an element from any position of an array.
17. Write a program to remove all the duplicates from an array.
18. Write a program to remove all the composite numbers from an array.
19. Write a program to find the largest group of same number from an array.

Example:

1	2	2	3	2	2	2	3	3	3	2
---	---	---	---	---	---	---	---	---	---	---

Here, there are two largest groups of length 3 in this array.

20. Write a program to sort an array in ascending order.

Example:

5	10	2	8	1	8	3
---	----	---	---	---	---	---

Output:

1	2	3	5	8	8	10
---	---	---	---	---	---	----