TOP PROGRAMMING QUESTIONS TO CHALLENGE AND INSPIRE

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BASIC PROGRAMMING QUESTIONS

1. **Calculate the Average of Numbers in a List**

   Write a program to find the average of numbers given in a list.

2. **Exchange Values of Two Variables Without a Temporary Variable**

   Write a program to swap the values of two variables without using a temporary variable.

3. **Convert Between Number Bases Without Built-in Functions**

   Write a program to convert numbers between decimal, binary, octal, and hexadecimal without using built-in conversion functions.

4. **Compute n + nn + nnn for a Given Number**

   Write a program to read a number nnn and compute the expression n+nn+nnnn + nn + nnnn+nn+nnn.

5. **Reverse a Given Number**

   Write a program to reverse the digits of a given number.

6. **Check Whether a Number is Positive or Negative**

   Write a program to determine if a given number is positive or negative.

7. **Calculate Grade from Marks of 5 Subjects**

   Write a program to input marks of 5 subjects and calculate the grade based on the total marks.

8. **Print Numbers in a Range Divisible by a Given Number**

   Write a program to print all numbers within a specified range that are divisible by a given number.

9. **Print Quotient and Remainder of Two Numbers**

   Write a program to read two integers and output their quotient and remainder.

10. **Generate All Possible Combinations of Three Digits**

    Write a program to accept three digits and print all possible combinations of these digits.

11. **Print Odd Numbers Within a Given Range**

    Write a program to print all odd numbers within a specified range.

12. **Find the Sum of Digits in a Number**

    Write a program to find the sum of the digits of a given number.

13. **Find the Smallest Divisor of an Integer**

    Write a program to find the smallest divisor of a given integer.

14. **Count the Number of Digits in a Number**

    Write a program to count the number of digits in a given number.

15. **Check if a Number is a Palindrome**

    Write a program to check if a given number is a palindrome.

16. **Print Integers Not Divisible by 2 or 3**

    Write a program to print all integers between 1 and 50 that are not divisible by either 2 or 3.

17. **Print Series 1+2+…+n**

    Write a program to read a number nnn and print the series $1+2+\ldots+n$.

18. **Print Natural Numbers Summation Pattern**

    Write a program to read a number nnn and print the natural numbers summation pattern.

19. **Print an Identity Matrix**

    Write a program to print an identity matrix of a given size.

MATHEMATICAL FUNCTIONS

1. **Validate and Increment a Date**

    Write a program to check if a date is valid and print the incremented date if it is.

2. **Compute Simple Interest**

    Write a program to compute simple interest given the principal, rate, and time.

3. **Check for a Leap Year**

    Write a program to determine if a given year is a leap year.

4. **Convert Height from Centimeters to Feet and Inches**

    Write a program to read a height in centimeters and convert it to feet and inches.

5. **Convert Temperature from Celsius to Fahrenheit**

    Write a program to take the temperature in Celsius and convert it to Fahrenheit.

6. **Compute Prime Factors of an Integer**

    Write a program to compute the prime factors of a given integer.

7. **Generate All Divisors of an Integer**

    Write a program to generate all divisors of a given integer.

8. **Print Multiplication Table of a Given Number**

    Write a program to print the multiplication table of a given number.

9. **Sum of Negative, Positive Even, and Positive Odd Numbers in a List**

   Write a program to print the sum of negative numbers, positive even numbers, and positive odd numbers in a list.

10. **Find the Largest Even and Odd Number in a List**

    Write a program to find the largest even and largest odd number in a list.

11. **Form Integer with Number of Digits at Ten's Place and Last Digit at Unit's Place**

    Write a program to form an integer with the number of digits at the ten's place and the least significant digit of the entered integer at the unit's place.

12. **Find Numbers Divisible by 7 and Multiple of 5 in a Given Range**

    Write a program to find those numbers which are divisible by 7 and multiple of 5 in a given range of numbers.

13. **Check if a Number is an Armstrong Number**

    Write a program to check if a given number is an Armstrong number.

14. **Print Pascal's Triangle**

    Write a program to print Pascal's triangle for a given number of rows.

15. **Check if a Number is a Perfect Number**

    Write a program to check if a given number is a perfect number.

16. **Check if a Number is a Strong Number**

    Write a program to check if a given number is a strong number.

17. **Find the LCM of Two Numbers**

    Write a program to find the least common multiple (LCM) of two numbers.

18. **Find the GCD of Two Numbers**

    Write a program to find the greatest common divisor (GCD) of two numbers.

19. **Compute a Polynomial Equation**

    Write a program to compute a polynomial equation given that the coefficients of the polynomial are stored in a list.

20. **Check if Two Numbers are Amicable Numbers**

    Write a program to check if two numbers are amicable numbers.

21. **Find the Area of a Triangle Given All Three Sides**

    Write a program to find the area of a triangle given the lengths of all three sides.

22. **Find the Gravitational Force Between Two Objects**

    Write a program to find the gravitational force acting between two objects given their masses and the distance between them.

23. **Check if a Number is a Prime Number**

    Write a program to check if a given number is a prime number.

24. **Print All Prime Numbers Within a Given Range**

    Write a program to print all the prime numbers within a specified range.

25. **Print Numbers in a Range Without Using Loops**

    Write a program to print numbers in a range (1 to upper limit) without using any loops.

26. **Find the Sum of Sine Series**

    Write a program to find the sum of a sine series up to a specified number of terms.

27. **Find the Sum of Cosine Series**

    Write a program to find the sum of a cosine series up to a specified number of terms.

28. **Find the Sum of First N Natural Numbers**

    Write a program to find the sum of the first N natural numbers.

29. **Find the Sum of the Harmonic Series**

    Write a program to find the sum of the harmonic series $1+1/2+1/3+\ldots+1/N$.

30. **Find the Sum of the Exponential Series**

    Write a program to find the sum of the exponential series $1+x^2/2+x^3/3+\ldots+x^n/n$.

31. **Compute Euler's Number eee**

    Write a program to compute the value of Euler's number eee using the formula $e=1+1/1!+1/2!+\ldots+1/n!$.

32. **Determine All Pythagorean Triplets in a Range**

    Write a program to determine all Pythagorean triplets within a specified range.

33. **Count the Occurrences of a Particular Number in a List**

    Write a program to search for the number of times a particular number occurs in a list.

LISTS AND ARRAYS

1. **Find the Largest Number in a List**

    Write a program to find the largest number in a given list.

2. **Find the Second Largest Number in a List**

    Write a program to find the second largest number in a given list.

3. **Separate Even and Odd Elements in a List**

   Write a program to separate even and odd elements in a list into two different lists.

4. **Merge and Sort Two Lists**

   Write a program to merge two lists and sort the resulting list.

5. **Sort a List According to the Second Element in Sublist**

   Write a program to sort a list of sublists according to the second element in each sublist.

6. **Find the Second Largest Number Using Bubble Sort**

   Write a program to find the second largest number in a list using bubble sort.

7. **Sort a List According to the Length of Elements**

   Write a program to sort a list based on the length of the elements.

8. **Find the Union of Two Lists**

   Write a program to find the union of two lists.

9. **Find the Intersection of Two Lists**

   Write a program to find the intersection of two lists.

10. **Create a List of Tuples with Number and Its Square**

    Write a program to create a list of tuples where the first element is a number and the second element is its square.

11. **Find Perfect Squares with Digit Sum Less Than 10**

    Write a program to find all perfect squares between 1 and 500 whose sum of digits is less than 10.

12. **Find Perfect Cubes with Digit Sum Less Than 10**

    Write a program to find all perfect cubes between 1 and 1000 whose sum of digits is less than 10.

STRINGS AND TEXT MANIPULATION

1. **Count Uppercase, Lowercase, Digits, and Special Characters in a String**

   Write a program to count the number of uppercase letters, lowercase letters, digits, and special characters in a string.

2. **Check if a String is a Palindrome**

   Write a program to check if a given string is a palindrome.

3. **Count Vowels and Consonants in a String**

   Write a program to count the number of vowels and consonants in a given string.

4. **Count Occurrences of Each Word in a String**

   Write a program to count the occurrences of each word in a given string.

5. **Reverse Each Word in a String**

   Write a program to reverse each word in a given string.

6. **Remove Duplicate Characters in a String**

   Write a program to remove duplicate characters from a given string.

7. **Find the First Non-Repeated Character in a String**

   Write a program to find the first non-repeated character in a given string.

8. **Check if Two Strings are Anagrams**

   Write a program to check if two given strings are anagrams of each other.

9. **Replace a Substring Within a String**

   Write a program to replace a substring within a given string with another substring.

10. **Check if a String Contains Only Digits**

    Write a program to check if a given string contains only digits.

DATE AND TIME

1. **Print the Current Date and Time**

   Write a program to print the current date and time.

2. **Print the Date After Adding N Days**

   Write a program to print the date after adding N days to the current date.

3. **Find the Number of Days Between Two Dates**

   Write a program to find the number of days between two given dates.

4. **Check if a Date is Valid**

   Write a program to check if a given date is valid.

5. **Print the Day of the Week for a Given Date**

   Write a program to print the day of the week for a given date.

6. **Print the Next 10 Leap Years**

   Write a program to print the next 10 leap years from the current year.

7. **Calculate Age Given Birth Date**

   Write a program to calculate a person's age given their birth date.

8. **Print All Sundays of a Given Year**

   Write a program to print all Sundays of a given year.

9. **Print the Calendar for a Given Month and Year**

   Write a program to print the calendar for a given month and year.

10. **Add Two Time Periods**

   Write a program to add two given time periods (hours, minutes, and seconds).

MISCELLANEOUS

1. **Generate Fibonacci Series Up to N Terms**

   Write a program to generate the Fibonacci series up to N terms.

2. **Find Factorial of a Given Number**

   Write a program to find the factorial of a given number.

3. **Generate a Random Number Between a Given Range**

   Write a program to generate a random number between a given range.

4. **Simulate Rolling a Die**

   Write a program to simulate the rolling of a die.

5. **Calculate the Area and Perimeter of Various Shapes**

   Write a program to calculate the area and perimeter of various shapes such as a rectangle, square, circle, and triangle.

6. **Convert Between Different Units of Measurement**

   Write a program to convert between different units of measurement such as inches to centimeters, pounds to kilograms, etc.

7. **Find the Hamming Distance Between Two Strings**

   Write a program to find the Hamming distance between two strings of equal length.

8. **Simulate a Simple Banking System**

   Write a program to simulate a simple banking system with functionalities such as deposit, withdraw, and check balance.

9. **Simulate a Vending Machine**

   Write a program to simulate a vending machine that accepts coins, dispenses items, and returns change.

10. **Find the Longest Common Subsequence Between Two Strings**

   Write a program to find the longest common subsequence between two given strings.