

Programming Assignments

1. A number is called an Armstrong number if the sum of the cubes of the digits of the number is equal to the number. For example $153 = 1^3 + 5^3 + 3^3$. Write a C program that asks the user to enter a number and returns if it is Armstrong or not (use function).
2. Write a program in C that takes as input a set of numbers and calculates the mean, variance and standard deviation. (variance is defined as $\Sigma [(xi - \bar{x})^2]/n - 1$, where $xi = i$ th number in the set, \bar{x} is the mean and $n=$ cardinality of the set ; standard deviation is the square root of variance).
3. Write a C program that calculates the HCF and LCM of two numbers.
4. Write a C program to display and find the sum of the series $1+11+111+\dots+111$ upto n. For eg. if $n=4$, the series is : $1+11+111+1111$. Take the value of 'n' as input from the user.
5. Write a C program that reads a positive integer n and then prints the following pattern

```
*****
-
 *****
____
 ****
_____
 ***
_____
 **
_____
 *
```

where n is the number of lines.

6. Amicable numbers are found in pairs. A given pair of numbers is Amicable if the sum of the proper divisors (not including itself) of one number is equal to the other number and vice – versa. For example 220 & 284 are amicable numbers
First we find the proper divisors of 220:
 $220: 1, 2, 4, 5, 10, 11, 20, 22, 44, 55, 110$
 $1 + 2 + 4 + 5 + 10 + 11 + 20 + 22 + 44 + 55 + 110 = 284$
Now, 284: 1, 2, 4, 71, 142
 $1 + 2 + 4 + 71 + 142 = 220$
Write a C program to check that the input pair of numbers is amicable.
7. Write a C function for the following problem:
Given a positive integer n, print the binary representation of n.
8. A triangular number is one which can be represented by that number of pebbles in a symmetric triangle. The first five triangular numbers are 1, 3, 6, 10 and 15.
Write a C function int isTriangular(int n) to test if a number 'n' is triangular or not.
It should return 1 if it is triangular and 0 if not.
 $T1=1 T2=3 T3=6 T4=10 T5=15$
9. Write a C program to find the reverse of an integer number.

10. Write a C program to sort an array of integers using bubble sort.
11. Write a C program to input n numbers in an array, calculate the sum of all even numbers and all odd numbers in the array and print the larger sum.

Example:

If the array contains the following elements:

2, 3, 3, 5, 4, 8, 7, 11, 2

The sum of all even elements is $2+4+8+2=16$

Sum of all odd elements is $3+3+5+7+11=29$

Therefore, the output should be 29.

12. Take the price and quantity of items as an input. Write a C function to calculate the sum of the prices. Write another C function to calculate the discount according to the following rules:

For total less than Rs.1000, discount is 5%.

For total greater than Rs.1000 but less than Rs.5000, discount is 10%.

For total greater than Rs.5000, discount is 15%.

Write another function to print the individual item prices, total, discount and the final price.

Example:

If the prices are as follows:

Item 1: 200

Item 2: 400

Item 3: 200

Item 4: 10

Item 5: 50

And the quantities are:

Item 1: 1

Item 2: 1

Item 3: 3

Item 4: 5

Item 5: 2

Then you should print:

Item	Price	Quantity	Subtotal
Item 1	200	1	200
Item 2	400	1	400
Item 3	200	3	600
Item 4	10	5	50
Item 5	50	2	100
<hr/>			
TOTAL			1350
Discount	10%		-135
<hr/>			
GRAND TOTAL			1215

13. Write a C program to calculate the volume of the following shapes: Cube, Cuboid, Sphere, Cylinder and Cone. Ask the user which one s/he wants to calculate, and take the appropriate required inputs. Then print the result. The input should be taken in the main function and calculations for every solid should be done in a separate function by passing appropriate arguments.

Example:

If the user chooses the option for cube, only one input is required i.e., the side. The volume is then calculated and printed.

If the user chooses the option for cuboid, only three inputs are required i.e., length, breadth and height. The volume is then calculated and printed.

14. Write a C program to check if a number has three consecutive 5s. If yes, print YES, else print NO.

Example:

Number: 1353554

Result: NO

Number: 345559

Result: YES

15. Write a C program to print the following pattern:

a) 1
1 2
1 2 3
1 2 3 4
1 2 3 4 5

b) 1
2 2
3 3 3
4 4 4 4
5 5 5 5 5

16. Write a C program to accept 10 values in an integer array. Display the number of odd, even, and negative numbers.

17. Write a C program to accept the basic salary of an employee from the user. Calculate the gross salary on the following basis:

Basic	HRA	DA
1 - 4000	10%	50%
4001 - 8000	20%	60%
8001 - 12000	25%	70%
12000 and above	30%	80%

18. Write a C function celsius() to convert degrees Fahrenheit to degrees Celsius. (The conversion formula is $^{\circ}\text{C} = 5/9 * (^{\circ}\text{F} - 32)$.) Use it to print a Fahrenheit-to-Centigrade table for -40 to 220 degrees Fahrenheit, in increments of 10 degrees. (Remember that %f is the printf format to use for printing floating-point numbers. Also, remember that the integer expression 5/9 gives 0, so you won't want to use integer division.)

19. An Electricity board charges the following rates for use of electricity.

For the First 200 units : Rs 1 per unit

For the next 100 units : Rs 1.5 per unit

Beyond 300 units : Rs 2 Per unit.

Write a C Program to read no of unit consumed and print out total charge amount.

20. Write a C program, which will print two digit numbers whose sum of both digit is multiple of seven.

e.g. 16,25,34.....

21. Write a C program, That reads list of n integer and print sum of product of consecutive numbers.

if n=7 and numbers are 4,5,2,5,6,4,7

then output is $4*5+5*2+2*5+5*6+6*4+4*7 = 122$.

22. Write a C program that take 2 integer sets A[] and b[] as input and prints results of following set operations:

- i. A union B (Write function set_union())
- ii. A intersection B (Write function set_intersection())
- iii. A-B and B-A (Write function set_difference())

23. Write a C program to take a list of n elements from the user. Store it in an array. Reverse the list.

24. Write a C program to check whether a given string is palindrome or not.

25. Write 2 different C functions to compute area and perimeter of a triangle whose sides a, b, and c are given by user as inputs.

Formula to compute perimeter = $a + b + c$

Formula to compute area = $[s(s-a)(s-b)(s-c)]0.5$

Where $s = 0.5 * (a+b+c)$

Function prototypes are:

```
double perim(double a, double b, double c)  
double area(double a, double b, double c)
```

Your program should read the input data and print the output data via separate functions. The prototypes are:

```
double read_input()  
double print_value(double val)
```

use math.h and compile with -lm flag

26. Input size and values in two arrays A and B, of max size 100. Then, compute $A[i]+B[i]$ and store in array C. And compute $A[i]*B[i]$ and store in array D.

27. Compute taxes for a given income with tax slab rates as follows...

slab 1... 0-2500: 0%

slab 2... 2500-5000: 10%

slab 3... 5000-10000: 20%
slab 4... 10000+: 30%
(for each range of a given income, the tax rate is different)

e.g. input: x = 5200
divisions are 0-2500, 2500-5000, 5000-5200

calculation:
0-2500 of x:
0% of 2500 = 0

2500-5000 of x:
10% of 2500 = 250

5000-10000 of x:
20% of 200 = 40

output: 290

28. Input date, month and year from the user, and using switch case, display in worded format.

e.g.
input: d=16, m=7, y=1992
output: 16th July, 1992

29. Find out the ugly prime number

Desc: The given number is ugly prime number if it's prime factor contains only among 2,3 or 5.

e.g. $20 = 2 \times 2 \times 5$ is ugly prime number
 $14 = 2 \times 7$ is not a ugly prime number

So write a C function which takes values from 1 to n and returns the number of ugly primes number in it.

input: 20
output: 3

30. Implement bubble sort, Insertion sort, binary search in C