

D1 : (a) Write a loop that will generate every third integer, beginning with **i= 2** and continuing for all integers that are less than **100**. Calculate the sum of those integers that are evenly divisible by **5**.

(b) Generalize the above problem by generating every **n**th integer, beginning with **nstart** (i.e., $i = \text{nstart}, \text{nstart} + n, \text{nstart} + 2*n, \text{nstart} + 3*n$, etc.). Continue the looping process for all values of **i** that do not exceed **nstop**. Calculate the sum of those integers that are evenly divisible by **k**, where **k** represents some positive integer.

D2 : Consider a department store customer who has exceeded the credit limit on a charge account. For each customer, the program should input following facts:

- Account number
- Balance at the beginning of the month
- Total of all items charged by this customer this month
- Total of all credits applied to this customer's account this month
- Allowed credit limit
- Write a Program to calculate the new balance (= beginning balance + charges – credits), and determine if the new balance exceeds the customer's credit limit. For those customers whose credit limit is exceeded, the program should display the customer's account number, credit limit, new balance and the message "Credit limit exceeded."

D3 : Write a complete **C** program for each of the problems presented below:

Calculate the weighted average of list of **n** numbers, using the following formula:

$$X_{\text{avg}} = f_1X_1 + f_2X_2 + f_3X_3 + \dots + f_nX_n$$

Test your program with the following values:

| i: | f: | x |
|----|------|------|
| 1 | 0.06 | 27.5 |
| 2 | 0.08 | 13.4 |
| 3 | 0.08 | 53.8 |
| 4 | 0.10 | 29.2 |
| 5 | 0.10 | 74.5 |
| 6 | 0.12 | 87.0 |
| 7 | 0.12 | 39.9 |
| 8 | 0.12 | 47.7 |
| 9 | 0.12 | 8.1 |
| 10 | 0.12 | 63.2 |

where **f_s** are the fractional *weighting factors* i.e. $0 \leq f_i \leq 1$ and $f_1 + f_2 + \dots + f_n =$

1.

Calculate the **geometric average** of a list of numbers, using the formula

$$X_{\text{avg}} = [X_1X_2X_3 \dots X_n]^{1/n}$$

Test your program with the following input: 6.2, 12.3, 5.0, 18.8, 7.1, 12.8

D4 : Consider the following list of countries and their capitals

- | | | |
|-------|---------|-----------|
| i. | Canada | Ottawa |
| ii. | England | London |
| iii. | France | Paris |
| iv. | India | New Delhi |
| v. | Israel | Jerusalem |
| vi. | Italy | Rome |
| vii. | Japan | Tokyo |
| viii. | China | Beijing |
| ix. | Russia | Moscow |

Write a menu driven program that will accept the name of a country as input and display the corresponding capital. Modify the program so that it repeats the execution until the word END is entered as input.

D5 : Implement following operations using switch statement

- i. (Sum a Sequence of Integers). - Assume that the first integer read with scanf specifies the number of values remaining to be entered. A typical input sequence might be 5 10 20 30 40 50 where the 5 indicates that the subsequent five values are to be summed.
- ii.(Average a Sequence of Integers) - It calculates and prints the average of several integers. Assume the last value read with scanf is the sentinel 9999. A typical input sequence might be 6 8 11 7 9 9999
- iii. indicating that the average of all the values preceding 9999 is to be calculated.

D6 : 2 colleges with 3 teams each participating in a technical quiz. Each team should consist of students from IT, ECE, CSE. Find the total number of students participated from each branch in both colleges.

i. Functional Description:

Complete the task using C editor by reading a set of integer values into a 2-D array and display the output.

ii. Constraints:

All values should be in integer

iii. Sample Test case:

| College1 | | | College2 | | |
|----------|---|---|----------|---|---|
| 2 | 3 | 4 | 1 | 2 | 5 |

| | | | | | | |
|----------|---|---|--|---|---|---|
| 3 | 4 | 5 | | 5 | 6 | 3 |
| 4 | 2 | 1 | | 6 | 2 | 4 |
| 21 19 22 | | | | | | |

D7: Consider a country with n states. Read capital income from n states and find the highest , lowest capital income

iv. Functional Description:

Complete the task using C editor by reading a set of integer values into a 1-D array and display highest and lowest values.

v. Constraints:

$n \geq 2$

All values should be in integer

vi. Sample Test case:

5
3
2
1
4
10
1 10

D8 : Government wants implement new pension scheme to people of the country based on the following criteria

| Age | Amount to be paid monthly | Pension after 60 Years |
|----------|---------------------------|------------------------|
| Below 18 | --- | Not Eligible |
| 18-22 | 210 | 5000 |
| 23-27 | 310 | 5000 |
| 28-35 | 410 | 5000 |
| 35-45 | 510 | 5000 |

i. Help the citizens to know how much amount need to be paid based on age criteria.

ii. Functional Description: Complete the task using C editor and the output of the program is to display a value.

iii. Sample Test case:

20
210
5000

The first integer indicates Age

Second integer indicates amount to be paid

Third integer indicates pension amount

D9 : A person brought a new house and wanted to paint his house. He has the following details: Length, Height, Breadth and cost for square feet to paint a single wall. Help him out to calculate the cost for painting work.

For example:

Given L=5, B=3, H=10, C=1000 and find total cost of house for painting

Functional Description:

Complete the task using C editor and the output of the program is to display a value.

Constraints:

$$0 < L < 100$$

$$0 < B < 100$$

$$1 \leq H \leq 10$$

$$C > 100$$

Sample Test case:

5

3

10

1000

150000

The first integer indicates Length

Second integer indicates Breadth

Third integer indicates Height

Fourth integer indicates Cost

Fifth value indicates total cost.

D10 : In the digital world colors are specified in Red-Green-Blue (RGB) format, with values of R, G, B varying on an integer scale from 0 to 255. In print publishing the colors are mentioned in Cyan-Magenta-Yellow-Black (CMYK) format, with values of C, M, Y, and K varying on a real scale from 0.0 to 1.0. Write a program that converts RGB color to CMYK color as per the following formulae:

$$\text{White} = \text{Max}(\text{Red} / 255, \text{Green} / 255, \text{Blue} / 255)$$

$$\text{Cyan} = (\text{White} - \text{Red} / 255) / \text{White}$$

$$\text{Magenta} = (\text{White} - \text{Green} / 255) / \text{White}$$

$$\text{Yellow} = (\text{White} - \text{Blue} / 255) / \text{White}$$

$$\text{Black} = 1 - \text{White}$$

D11 : Write an interactive C program that will convert a date, entered in the form mm- dd- yy (example: 4- 12-99) into an integer that indicates the number of days

beyond January 1, 1980. If the year does not extend beyond 1999 ($yy \leq 99$), we can make use of the following relationships:

(i) The day of the current year can be determined approximately as:

$$\text{day} = (\text{int}) (30.42 * (\text{mm} - 1)) + \text{dd}$$

(ii) If $\text{mm} == 2$ (February), increase the value of day by 1.

(iii) If $\text{mm} > 2$ and $\text{mm} < 8$ (March, April, May, June or July), decrease the value of day by 1.

(iv) If $yy \% 4 == 0$ and $\text{mm} > 2$ (leap year), increase the value of day by 1.

Test the program with your choice of date.

D12 : Suppose that X amount is borrowed from a bank, with the understanding that Y amount will be repaid each month until the entire loan has been repaid. Part of the monthly payment will be interest, calculated as I percent of the current unpaid balance. The remainder of the monthly payment will be applied toward reducing the unpaid balance.

Write a C program that will determine the following information:

(i) The number of monthly payments required to repay the entire loan.

(ii) The amount of interest paid each month and the amount of money unpaid balance each month.

(iii) The total amount paid at the end of the repay inclusive of interest.

Test your program using the following data: $X = 40,000$; $Y = 2000$, $i = 1\%$ per month

D13 : Write a C program to calculate the net salary of an employee using the following details:

Based on the category of employee like manager (Rs 40,000-50,000), Team lead (Rs 30,000-40,000), software engineer (Rs 20,000-30,000) change the salary input and CALCULATE THE NET SALARY as per the following details

[all the parameters mentioned below to be accepted as floating point numbers]

a. $DA = 90\%$ OF BASIC SALARY.

b. $HRA = 35\%$ OF BASIC SALARY.

c. $PF = 12\%$ OF BASIC SALARY.

d. $GROSS\ SALARY = BASIC\ SALARY + DA + HRA$.

e. $INCOME\ TAX = 30\%$ OF GROSS SALARY

f. $NET\ SALARY = GROSS\ SALARY - INCOME\ TAX - PF$

