

MCA-1 Programming Lab
Set-A: C Language Assignments

1. Write a menu driven program to convert any Celsius temperature to Fahrenheit and vice-versa.

Test Case	Input	Output
1	100 deg C	212 deg F
2	98.3 deg F	36.8333 deg C
3	-17.7778 deg C	0 deg F

2. In a banking system, there are the following denominations of notes: Rs. 10, Rs. 20, Rs. 50, Rs. 100. Write a program that will accept an amount and find the minimum number of each note required to pay the amount.

Test Case	Input	Output
1	5990	100 x 59 50 x 1 20 x 2 10 x 0
2	2507	NOT possible
3	0	100 x 0 50 x 0 20 x 0 10 x 0
4	10	100 x 0 50 x 0 20 x 0 10 x 1
5	40	100 x 0 50 x 0 20 x 0 10 x 0
6	10000	100 x 100 50 x 0 20 x 0 10 x 0

3. In a hotel, a professor lives in room no. X. The room numbers are sequentially numbered from 1 to n (n can be any integer). The sum of the room numbers left to X is equal to the sum of the room numbers to the right of X. Write a program to find X.

Test Case	Input	Output
1	1	1
2	8	6
3	1681	1189
4	57121	40391
5	289	Does not exist.

4. Write a program to convert an 8-digit number into words (consider both the Indian and International number system).

Test Case	Input	Output (Indian)	Output (International)
1	29569995	(2,95,69,995)* two crore ninety five lakh sixty nine thousand nine hundred ninety five	(29,569,995)* twenty nine million five hundred sixty nine thousand nine hundred ninety five
2	30000000	(3,00,00,000)* three crore	(30,000,000)* thirty million
3	90002001	(9,00,02,001)* nine crore two thousand one	(90,002,001)* ninety million two thousand one
4	40027512	(4,00,27,512)* four crore twenty seven thousand five hundred twelve	(40,027,512)* forty million twenty seven thousand five hundred twelve

*Don't print the number written inside the braces.

5. Write a program to find the value of one number raised to the power of the other number without using the library function pow().

Test Case	Input	Output (n^p)
1	$n=0, p \leq 0$	undefined
2	$n=0, p=67$	0
3	$n=-1, p=-100567$	-1
4	$n=-7.34, p=6$	156378.253883

6. Write a program to compute GCD of two numbers. Implement the program using the Euclid Algorithm and the factorization method.

Test Case	Input (m & n)	Output (gcd(m,n))
1	$m = 0$ $n = 0$	Infinity
2	$m = 0$ $n = \text{any non-zero +ve integer}$	n
3	$m = 1$ $n = \text{any non-zero +ve integer}$	1
4	$m = 999901111$ $n = 111000999$	1
5	$m = 9324$ $n = 27972$	9324
6	$m = 27972$ $n = 8820$	252

7. Write a program to compute LCM of n integers.

Test Case	Input	Output
1	n = 6 45, 12, 50, 1, 8, 75	1800
2	n = 1 56	56
3	n = 5 88661, 90001, 99991, 0, 75	Cannot be calculated (undefined).
4	n = 2 47821, 1209	57815589
5	n = 4 252, 144, 216, 72	3024
6	n = 4 101028, 50514, 33676, 25257	101028

8. Write a program to compute the following series:

a. $\sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} \dots$

Test Case	Input	Output
1	10.995574	-1.0
2	-3.665191	0.5
3	0.785398	0.707107

b. $\cos(x) = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} \dots$

Test Case	Input	Output
1	10.995574	0
2	-26.18	0.5
3	0.785398	0.707107

c. $\log(1 + x) = x - x^2/2 + x^3/3 - x^4/4 \dots$; where $-1 < x \leq 1$.

Test Case	Input	Output
1	0.35	0.300105
2	-0.63212056	-1
3	1	0.693147

d. $e = 1/1! + 2/2! + 3/3! + \dots$ (up to 10 terms).

Test Case	Input	Output
1	2	2
2	6	2.71667
3	10	2.71828

e. $2*3 + 3*5 + 5*7 + \dots$ (up to n terms, where n will be user input).

Test Case	Input	Output
1	0	0
2	5	276
3	50	764897
4	1000	1468480019

9. W.A.P. to print all prime numbers between 1 and n. (n will be given as input).

Test Case	Input	Output
1	2	No prime number present.
2	100	2, 3, 5, 7, ... 89, 97.
3	3	2.
4	99991	2, 3, 5, 7, 11, 13, ... 99961, 99971, 99989.

*You can print the output as space-separated values.

10. Write a program to find the reverse of any number & check whether the number is a palindrome or not.

Test Case	Input	Output
1	12383321	Reverse: 12338321 It is NOT a palindrome.
2	0100101001	Reverse: 100101001 It is a palindrome.
3	0220	Reverse: 22 It is NOT a palindrome.
4	11222233334 44410014444 3333222211	Reverse: 11222233334444100144443333222211 It is a palindrome.

11. Write a program to generate the n-th Fibonacci number where n will be taken as input. There is a formula for computing the n-th Fibonacci number:

$$F_n = \frac{1}{\sqrt{5}} \left(\frac{1+\sqrt{5}}{2} \right)^n - \frac{1}{\sqrt{5}} \left(\frac{1-\sqrt{5}}{2} \right)^n$$

Compute n-th Fibonacci number without using the formula and using the formula, and compare these two are they same?

Test Case	Input	Output
1	2	Actual Output: 1 Formula Output: 1 Difference: 0
2	8	Actual Output: 21 Formula Output: 21 Difference: 4.6161e-015
3	30	Actual Output: 832040 Formula Output: 832040 Difference: 7.97627e-010
4	71	Actual Output: 308061521170129 Formula Output: 3.08062e+014 Difference: 0.71936

*Difference = | Actual Output - Formula Output |

12. Write a program to compute an union of two sorted lists of integers so that the resultant list remains sorted.

Test Case	Input	Output
1	8 -6 0 9 9 10 23 76 87 6 -8 -6 9 10 22 87	-8 -6 -6 0 9 9 9 10 10 22 23 76 87 87
2	1 -30 2 -90 0	-90 -30 0
3	6 -9 1 9 10 35 43 1 43	-9 1 9 10 35 43 43

13. Consider that M is a $n \times n$ square matrix whose each row contains real numbers or 0 such that the sum of each row is 1. If R is a n -dimensional column vector whose each component is $1/n$. Use a random number generator to create the matrix M . Write a program to compute: $R = (M^p)R$, where p should be taken as input.

Test cases: Show that for any positive integer 'p', the relation ' $R = (M^p)R$ ' holds. (Can you explain why?)

14. Write a program (WAP) to implement Pascal Triangle.

Test Case	Input	Output
1	1	1
2	6	1 1 1 1 2 1 1 3 3 1 1 4 6 4 1 1 5 10 5 1