

ACROPOLIS INSTITUTE OF TECHNOLOGY AND RESEARCH

DEPARTMENT OF INFORMATION TECHNOLOGY

Workshop on Programming Skills

Problem Set - I

Resource Persons: *Dr Kamal K Sethi, Mr. Ajay Khatri, Ms Anita Mahajan, Ms Priyanka Jangde, Ms Sonal Dubey and Ms Medhavi Bhargava*

Simple Problems

1. Write a C program to display "Hello World" on the screen.
2. Write a C program to display "Hello" followed by Your Name, Address and City in different lines.
3. Write a C program to find the area of a circle using the formula: $\text{Area} = \pi * r * r$.
4. Write a C program to find the area and volume of sphere. Formulas are: $\text{Area} = 4 * \pi * R * R$ $\text{Volume} = (4/3) * \pi * R * R * R$.
5. Write a C program to print the multiply value of two accepted numbers.
6. Write a C program to convert centigrade into Fahrenheit. Formula: $C = (F - 32) / 1.8$.
7. Write a C program to calculate simple interest.
8. Write a C program to read in a three digit number produce following output (assuming that the input is 347)-
3 hundreds, 4 tens, 7 units
9. Write a C program to read in a four digit number produce following output (assuming that the input is 1347)-
One Thousand Three Hundred Forty Seven.
10. Write a C program to read in two integers and display one as a percentage of the other. Typically your output should look like 20 is 50.00% of 40 assuming that the input numbers where 20 and 40. Display the percentage correct to 2 decimal places.
11. Write a C program to find out whether the character presses through the keyboard is a digit or not (using conditional operator).
12. Write a C program to swap variable values of x and y.
13. Program to swap of two number's without using third variable.
14. Write a C program to find the maximum from given three nos.
15. Write a C program to find that the accepted no is Negative, Positive or Zero.
16. Write a program which reads two integer values. If the first is lesser print the message up. If the second is lesser, print the message down if they are equal, print the message equal, if there is an error reading the data, print a message containing the word Error.
17. Write a C program that prints the given three integers in ascending order using if – else.
18. State the order of evaluation of the operations in each of the following C statements and implement them to show the value of x after each statement.
 - a) $x = 7 + 3 * 6 / 2 - 1$;
 - b) $x = 2 \% 2 + 2 * 2 - 2 / 2$;
 - c) $x = (3 * 9 * (3 + (9 * 3 / (3))))$;
19. Write a C program that declares 5 integers, determines and prints the largest and smallest in the group.
20. The University Grading System has the following criteria to determine the marks division. Here is the given percentage serve as an input data and the characterization as output information.
Percentage----Division
N<5.0-----Fail
5.0<=N<5.5----Third Division
5.5<=N<6.5----Second Division
6.5<=N<7.5----First Division
Higher-----Distinction

21. Write a C program that declares two integers, determines whether the first is a multiple of the second and print the result. [Hint: Use the remainder operator.]
22. Given as input three integers representing a date as day, month, year, print the number day, month and year for the next day's date. [Typical input: "28 2 1992" and Typical output: "Date following 28:02:1992 is 29:02:1992".]
23. Write a program in C that accepts dates written in numerical form and then output them as a complete form.
Sample input: 2 26 1986
Sample output: February 26, 1986.
24. Write a C program for calculator designing using switch case loop?

Loops Problems

25. Program to display first N natural number, their sum and average.
26. Write a C program to find the sum of first 100 odd number and even number.
27. Write a C program that will scan a number N and then output the sum of the powers from 1 to N. thus, if the input is 4, the output should be 288. $1+4+27+256=288$ [1,2,3,4]
28. Program to find whether given number is a prime number or not.
29. Write a C program to display first 100 prime nos.
30. Write a C program to find all the prime number between two given numbers.
31. Program to find Factorial of a given number.
32. Program to print Fibonacci series up to N.
33. Program to display sum of series $1+1/2+1/3+.....+1/n$.
34. Program to display series and find sum of $1+3+5+.....+n$.
35. Display the following output on screen (assuming the value for input parameter n=5) :

a. * ** *** **** *****	b. 1 12 123 1234 12345	c. A AB ABC ABCD ABCDE	d. 1 23 345 4567 56789
e. ***** **** *** ** *	f. ABCDE ABCD ABC AB A	g. * *** ***** ***** *****	h. 1 123 12345 1234567 123456789
i. * ** *** **** *****	j. ABCDE ABCD ABC AB A	l. 1 12 123 1234 12345	m. ***** 0000 *** 00 *
n. 1 01 101 0101 10101	o. 1 22 333 4444 55555	p. 1 232 34543 4567654 567898765	q. ABCDEDCBA ABCD DCBA ABC CBA AB BA A A

36. Program to find whether a given number is even or odd without using mod(%) operator.

37. Write a function myMod(a, b) to implement the functionality of mod operator(%) without using mod operator or function. For example myMod(12,5) will return 2, myMod(12,4) will return 0 and myMod(-12,5) will return 3.

Simple Number Problems

38. Write a C program to find the sum of digits of accepted no.
39. Write a C program to print the accepted no and its reverse no.
40. C program to check whether a given number is palindrome or not. **Palindrome number** is a number that remains same, when it is reversed or can be read in the same way in either direction.
41. Write a C Program to find the given number is strong or not? A number is called **strong number** if sum of the factorial of its digit is equal to number itself. Example: 145 since $1! + 4! + 5! = 1 + 24 + 120 = 145$.
42. Write C Program to add one to digits of a number. C Program that adds the 1 to each single digit of a number, i.e. for Example 12345's output is 23456. If the digit is 9 it adds 1 and follows the carry system, 9 becomes 0 and 9's left digit adds one more 1. I.e., 3491's output is 4602.
43. C Program to check the given number is Armstrong number or not? **Armstrong number** is a number that is the sum of its own digits each raised to the power of the number of digits. Example: $153 = 1^3 + 5^3 + 3^3$.
44. C Program to check the given number is perfect or not? **Perfect Number** is a positive integer that is equal to the sum of its proper positive divisors. For example 6, divisors of 6 are 1, 2 and 3. Sum of divisors is $1+2+3=6$.
45. Write a program to convert a number into string. For example 1234.56 output will be One Thousand Two Hundred Thirty Four Rupees Fifty Six Paise. (Max 10 Digit Number only)
46. Write a C program to print all the Factors of accepted no.
47. Program to find prime factors of a given number. For example $45=3*3*5$, $38=19*2$ and $8=2*2*2$.
48. Write a C program to find the GCD and LCM of two integers output the results along with the given integers. Use **Euclid's algorithm** to find the GCD and LCM. Euclid's algorithm uses the division algorithm which repeatedly divides starting from the two numbers we want to find the GCD of until we get a remainder of 0.
49. C Program to calculate the Combination and Permutations. Combination means way of selecting a things or particular item from the group or sets. ${}^nC_r = n! / r!(n-r)!$. Permutations means possible way of rearranging in the group or set in the particular order.
50. Program to find the value of Pi at N^{th} Decimal places.

System Conversion Problems

51. C Program to convert binary number into its equivalent Decimal, Octal, and Hexadecimal number systems. In this program first convert the binary number to decimal number, and then converted that decimal to octal and decimal to hexadecimal.
52. C Program to calculate the 2's complement of a binary number. **2's complement** of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100.
53. Program to convert 24 Hours time to 12 Hours time format.
54. Program to add two time value.
55. Program to find the number of days between two dates.

String Problems

56. Two strings are said to be anagrams, if the characters in the strings are same in terms of numbers and value, only arrangement or order of characters are may be different. Example: "dfghjkl" and "lkjghdf" are anagrams of each other.

57. C Program to find the position of a sub string in a given string. In this program, we find the position of a sub string where it starts in the main string.
58. Write User Defined Function and test them in the main program for the following standard function
- a) `int myatoi(char *s)`
 - b) `char *myitoa(int i)`
 - c) `int mystrlen(char *s)`
 - d) `char *mysubstr(char *s, int i, int j)`
 - e) `char *mystrcat(char *s1, char *s2)`
 - f) `int mystrcmp(char *s1, char *s2)`
 - g) `int mystchr(char *s, char c, int i)`
 - h) `char *mystrev(char *s)`
 - i) `int mystrend(char *s, char *t)`
 - j) `char *myreplace(char *s, char *old, char *new)`
 - k) `char *mytoupper(char *)`
 - l) `char *mytolower(char *)`
 - m) `int isupper(char *s)`
 - n) `int islower(char *s)`
59. C Program to find the position of nth occurrence of a character in a given string. Also find last occurrence of character in string.
60. C Program to copy and concatenate strings without using standard functions. In this program, we copy one string from another, and without using the standard library function `strcpy` from `string.h`. Here we append the one string to another without using the `strcat` function.
61. C Program to convert a Roman numeral to its decimal equivalent. Roman numbers are the oldest number system used in ancient Rome. They use the combination of letters from Latin alphabet to represent the system. We used the if-else and for statements to solve this problem.
62. Write a program to take a sentence as input and reverse every word of the sentence.

Arrays Problems

63. Write a C program to find minimum, maximum, sum and average of the given one dimensional array.
64. Write a C program to input N numbers and find their mean, variance and standard deviation. Mean is sum of values divided by the total number of values. Variance shows the how the data s are distributed. Standard deviation is the square root of its variance.
65. Write a C program to reverse an array.
66. Write a C program that counts no of 1's and 0's in an array having elements 1 or 0.
67. Write a C program to input N numbers (integers or real) and store them in an array. Conduct a linear search for a given key number and report success or failure in the form of a suitable message. **Linear search** is the basic searching algorithm, also called as sequential search. Algorithm search's the element by comparing the each element in the list, until the desired element found.
68. C Program to implement binary Search. Binary search technique is simple searching technique which can be applied if the items to be compared are either in ascending order or descending order. The general idea used in **binary search** is similar to the way we search for the telephone number of a person in the telephone directory. Binary search is the divide and conquer strategy.
69. Write a C program to merge two arrays. In this program we check the elements of arrays A, B and put that element in the resulted array C in sorted manner.
70. Write a C program to sort a string. In this program we sort the string using bubble sort technique. **Bubble Sort** is the simplest and easiest sorting technique. In this technique, the two successive items $A[i]$ and $A[i+1]$

are exchanged whenever $A[i] > A[i+1]$. The larger values sink to the bottom of the array and hence it is called sinking sort. The end of each pass smaller values gradually "bubble" their way upward to the top (like air bubbles moving to surface of water) and hence called bubble sort.

Two Dimensional Arrays Problems

71. Write a C program to produce a multiplication table in a two dimensional array. Top left hand corner will show 1x1 and bottom right shows 10x10.
72. Write a C program to perform the basic Matrix operations addition and subtraction.
73. C Program to interchange the main diagonal elements of the matrix. This Program will accept a matrix of order $M \times N$ and store its elements and interchange the main diagonal elements of the matrix with that of the secondary diagonal elements.
74. Write a c program to check whether the given matrix is a magic-square matrix or not? The matrix is **magic-square matrix**, if all rows sum, columns sum and diagonals sum must be equal. Example:

8 1 6

3 5 7

4 9 2 is the magic square matrix.

75. Write down a program to find given number in two dimensional array.
76. Write down a program to sort two dimensional array.
77. C Program to find the Multiplication of two matrices. C Program Develop functions
 - o) To read a given matrix
 - p) To output a matrix
 - q) To compute the product of two matrices

Use the above functions to read in two matrices A ($M \times N$) B ($N \times M$), to compute the product of the two matrices, to output the given matrices and the computed matrix in a main function

78. Write a C program to read A ($M \times N$), find the transpose and determinant of a given matrix and output both the input matrix and the transposed matrix and value of determinant. **Transpose** of a matrix is the interchanging the rows and columns, If A is matrix of order ($i \times j$), where i is the row and j is the column, then Transpose of A is $A(j \times i)$.
79. Write a C program to evaluate the given polynomial $P(x) = A_n X_n + A_{n-1} X_{n-1} + A_{n-2} X_{n-2} + \dots + A_1 X + A_0$, by reading its coefficients into an array. A Polynomial is a mathematical expression involving a sum of powers in one or more variables multiplied by coefficients.

File Handling

80. Write a C program to implement myprintf and myscanf functions using Concept of variable number of arguments.(using getch, putch, gets and puts function)
81. Write a C program that creates an Employee text file? Records are empid, empname, designation, qualification, salary, experience, Research work, address, city phone?
82. Write a C program that manipulates the above text file. The program must implements the operation to modify a record, delete a record and append new records.
83. Write C programs for the following operation to work like DOS Commands:
 - r) type abc.txt
 - s) copy source1.txt source2.txt
 - t) compare source1.txt source2.txt
 - u) concat source1.txt source2.txt
84. Write a C program to open two files containing integers (in sorted order) and merge their contents.

85. Write a C program to count the number of vowels, consonants, digits, spaces, other symbols, words and lines in a given text file.
86. Write a c program to create a new data type Date with the help of structure and typedef. Also write following user defined function for date manipulation.
 - v) To return next Date,
 - w) To return next Month,
 - x) To return next Year,
 - y) To add few Days in a date
 - z) To add few Months in a date
 - aa) To add few Years in a date
 - bb) To return the date of the week of a given date.
 - cc) To return Month name from the date.
 - dd) To Display the Date in various format as: `Date Display(Date d1, char *format)`. Here Date is the newly created data type. The format string can hold the following values: "DDMMYYYY", "MMDDYY", "MON, DD, YYYY"

Miscellaneous Problems

87. Program to find square root of given number without using any inbuilt function.
88. Program to Solve Tower of Hanoi Problem.
89. Program to find the factorial of large number(1000).
90. Write a c program to find all the permutations of a given string. Example: If the given string is sam, output is,

sam sma msa mas asm ams
91. C Program to reverse the first N characters in a file using the command line arguments. Here we read the file name and N are specified on the command line. If file exists, it reverse the N characters, else it gives the error message.
92. Print yesterdays date. You can use the ANSI standard functions 'time' and 'ctime'. An example of the O/P from my program is Fri Mar 17 18:46:47 1995.
93. Write a C Function for the following task
 - ee) Factorial of a given number
 - ff) Nth Fibonacci number
 - gg) Swapping the values of two variable
 - hh) Reverse of a given String
 - ii) Reverse of a give Number
 - jj) Minimum/maximum value from the given input array
 - kk) Search an element in an array of integer
 - ll) Binary Search
 - mm) LCM & GCD
 - nn) Absolute Value |A|
 - oo) Power Function XY
 - pp) Mod Function A%B
94. Write C code to check if an integer is a power of 2 or not.
95. Write a C program to count bits set in an integer?
96. Write a C program to set a particular bit in a given number.
97. Write a C program to reset a particular bit in a given number.
98. Write a C program to ON/OFF the caps lock, num lock keys.
99. Write a C program to

C++ Programs-

100. Create a class called Employee that includes three pieces of information as instance variables – a first name (type String), a last name (type String) and a monthly salary (double).
 - qq) Create a constructor in above class to initialize the three instance variables.
 - rr) Provide a get method for each instance variable.
 - ss) Provide a set method for each instance variable.
 - tt) Create two employee objects and display each object's yearly salary.
 - uu) Give each employee a 10% raise and display each Employee's yearly salary again.
101. Write C++ program to create five object of book, get information of book using getdata() function including name, price, publication and author. Write search() function to search a specified book, if book is search return the complete information of book and print the information of book using putdata() function.
102. Write a C++ program for complex number, in which you are overloading all arithmetic operators along with [] operator.
103. Write a program that accepts two values either integer or double. Design functions that understand the input, add them and provide the correct output.
104. Create a base class called shape. Use this class to store two double type values that could be used to compute the area of figures. Derive two specific classes called triangle and rectangle from the base shape. Add to base class, a member function get_data() to initialize base class data members and another member functions display_area() to compute and display the area of figures. Mark the display_area() as a virtual function and redefine this function in the derived class to suit their requirements.(Use pure virtual function)
105. Create a base class that contains a function display(), displaying "I am in base" . Function with same name display() is in derived class ,displaying "I am in derive".
106. Write a function template for finding the minimum value contained in an array.
107. Write a class template to represent generic vector include member function to perform following tasks.
 - vv) To create a vector.
 - ww) To modify the value of given element.
 - xx) To multiply by scalar value.
 - yy) To display the vector.
- 108.