PDS LAB – 5 (Section-5) Date: 6th February 2017;

Arrays, Strings & Functions

Tutorial Problems

1. Write C functions to (i) find the length of the string and (ii) reverse the string. Through main () function enter the string using key board and demonstrate the above functions.
2. Write a C function to determine sin(x) using the following expression $\left(x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \cdots\right)$. Through main () function provide the value of x in 'degrees' and number of terms to be considered for computation. Demonstrate the C function by calling through main program.
3. Write C functions to find (i) sum of two matrices and (ii) transpose of a matrix. Through main () function enter two matrices and demonstrate the above written functions.

Assignment Problems (For All Students)

1. Write C functions to compute (i) square of a number and (ii) average of the given array of numbers. Through main () function, enter the array of numbers and use the above C functions while computing the variance and standard deviation of the entered sequence of numbers.
2. Write C functions to (i) reverse the string and (ii) comparison of 2 strings. Through main () function enter the strings and demonstrate the above functions. Also, evaluate whether the given string is palindrome or not, by using the above functions.
3. Write a C function to determine cos(x) using the following expression $\left(1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \cdots\right)$. Through main () function provide the value of x in 'degrees' and termination the evaluation when the difference between successive computations is below 0.00001. Demonstrate the C function by calling through main program.
4. Write a C function to sort the array of numbers using Bubble Sort. Through main () function, enter the array and number of elements and call the above developed function to sort the given array.
5. Write a C program to determine the LCM of 2 given numbers. Use co-prime function to verify the 2 number or co-prime or not. Procedure to compute LCM is successively divide the 2 numbers by a common divisor till the numbers become co-prime. At that point multiply all common divisors and left-over numbers.

   Example:
   Input: n1 = 24, n2 = 40; (Co-prime: No)
   Divide by 2: 12 and 20 (Co-prime: No)
   Divide by 2: 6 and 10 (Co-prime: No)
   Divide by 2: 3 and 5 (Co-prime: Yes)
   LCM = 2 X 2 X 2 X 3 X 5 = 120.

Assignment Problems (For those who completed 5 assignment problems)

1. Write a C function to search an element in a sorted array using binary search approach. Through main () function, enter the array and use first Bubble Sort function to sort the array, then demonstrate the binary search function to search the given element.
   Example:
   Input: 4 3 2 5 7 6 8 1 9 and element to search = 2
   Step-1: Sorted array: 1 2 3 4 5 6 7 8 9
   Step-2: Binary search
   Check the 'element to search' with 'middle element' and consider the partition to search repeatedly.

2. Write C functions to retrieve (i) the name of the state given the city name and (ii) the names of the cities given the name of the state. Through main () function enter the names of the states and their respective cities and call the above functions to demonstrate the retrieval process.

State	**City**			
Andhra Pradesh	Vijayawada	Guntur	Vizag	Tirupati
Tamil Nadu	Chennai	Madurai	Coimbatore	Tiruchi
Karnataka	Bangalore	Mysore	Beedar	Mangalore
Uttar Pradesh	Kanpur	Luknow	Allahabad	Banaras

3. Write a C program to display the elements of a matrix by traversing the path such that the sum of row and column indices increases incrementally.
   Input:

   1 2 3 4
   5 6 7 8
   9 10 11 12
   13 14 15 16

   Output-1:
   1
   2, 5
   9, 6, 3
   4, 7, 10, 13
   14, 11, 8
   12, 15
   16

   Output-2:
   1
   5, 2
   9, 6, 3
   13, 10, 7, 4
   14, 11, 8
   15, 12
   16

PDS LAB – 04

Section – 12

Date: 22.08.16

Tutorial 1

1. Computation of series sum

Consider the following power series:

$e^x = 1 + x/1! + x^2/2! + x^3/3! + \_ \_ \_$

The nth term, tn, and the sum up to the nth term, Sn, are defined inductively as follows:

tn = 1 if n = 0;

= x . tn_1/n if n > 0

Sn = t_0 if n = 0;

= Sn_1 + tn if n > 0:

Tutorial 1 contd.

Some of the similar series sum expressions power series:

1. $\cos(x) = 1 - x^2/2! + x^4/4! - x^6/6! + \ldots\ldots\ldots$
2. $\sin(x) = x - x^3/3! + x^5/5! - x^7/7! + \ldots\ldots\ldots$
3. $\ln(1+x) = x/1 - x^2/2 + x^3/3 + \ldots\ldots\ldots$
4. $\ln(1-x) = -x/1 - x^2/2 - x^3/3 - \ldots\ldots\ldots$

Function

- A *function is a self-contained program segment that* carries out some specific, well-defined task.
- main is a function.
- Program execution begins from main
- There can be multiple functions. They can appear in any order.
- One function definition cannot be embedded within another.
- A function will carry out when it is “called”

Function

- A function will process information passed to it from the calling program
- Information is passed via special identifiers called arguments or parameters
- The value is returned via the return statement

Function Definition

- data-type name (argument1, argument 2, ….
  ……. argument n)

- return expression; // expression is optional

- A function can return only one value

Function

```
long int fact(n)

  int n;
   {
      int i;
      long int prod = 1;
      if (n > 1)
         for (i =2; i <= n; ++i)
              prod *= i;
      return(prod)
    }
```

Function

```
#include <stdio,h>
main()
  {
    int n;
    long int fact(); // function declaration
    printf("\n Enter the number ");
    scanf("%d", &n);
    printf("\n the factorial is %ld", fact(n));
  }
```

Tutorial 2

2(a). Write a C function fact(n) to compute the factorial of “n”. Read n from keyboard and print it’s factorial in the main program.

(b). Write a program to compute the value of ${}^{n}C_{r}$ by using the above function fact(n).

Read n and r in the main program and print the inputs (n and r) and the output (${}^{n}C_{r}$).

Assignment 1

This Problem is same as that of Tutorial 2

2(a). Write a C function fact(n) to compute the factorial of “n”. Read n from keyboard and print it’s factorial in the main program.

(b). Write a program to compute the value of ${}^{n}C_{r}$ by using the above function fact(n).

Read n and r in the main program and print the inputs (n and r) and the output (${}^{n}C_{r}$).

Assignment 2

2. Write a C function sin(x) to compute the sine of an angle using the following sine infinite series

$$\sin(x) = x - x^3/3! + x^5/5! - x^7/7! + \ldots\ldots\ldots;$$

where x is in radian.

Write a main program which reads three different values of x and the number of terms n from the keyboard and print the result along with the inputs.

Assignment 3

5. Write a C function *ComputeFactor() which takes two inputs -*

the number and another positive integer onefactor. The

function returns the value onefactor if it is a factor of number otherwise returns zero value.

(b) A number is said to be perfect if it is equal to the sum of all its factors including 1 (and obviously excluding itself).

For Example,

6 = 1 + 2 + 3,

28 = 1 + 2 + 4 + 7 + 14 are perfect and

12 (factors = 1, 2, 3, 4, 6) is not perfect.

Assignment 3 contd.

Write a C program which reads number n and prints whether the given number is perfect or not.

The program uses the function *ComputeFactor()*