Data structures and Algorithms
LAB 1:
classes , functions and pointers

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1 Pointer

Explain the difference between given declarations and how to read them.

```
const int * p ;
int const * p ;
int * const q ;
```

For each of the following, write a single statement that performs the indicated task. Assume that foating point variables number1 and number2 have been declared and the number1 has been initialized to 7.3.

1. Declare the variable fPtr to be a pointer to an object of type double.
2. Assign the address of variable number1 to pointer variable fPtr.
3. Print the value of the object pointed by fPtr. 1
4. Print the value of number2.
5. Print the value of number1.
6. Print the address stored in fPtr. Is the value printed the same as the address of number1?

2 Functions

1. Write a function template that find minimum in an array of 10 elements.
2. Write a function template that returns true if all elements in an array are unique otherwise false.
3. Write a function that find the greatest common divisor of two integers. The greatest common divisor is the largest integer that evenly divides each of the number.

3 Arrays

Answer the following questions regarding an array called **rationals**

1. Define a constant variable **arraySize** initialized to 10.
2. Declare an array rationals with arraySize elements of type double, and initialize the elementss to 0.
3. initialize the fourth element from the beginning of the array to 2.84.
4. Assign the value 1.667 to array element 9.
5. Print array elements 6 and 9
6. Print all the elements of the array using a for structure. Define the integer variable x as a control variable for the loop. Show the output.

3.1 sorting Arrays

create an array named **unsrotedArray** of size 10 and intialize it with different values.

1. create a function named **copyArray** which takes two arrays and copy one array to other.
2. create a function named **SelectionSort** which accepts an array and returns a sorted array using selection sort.
3. create a function named **BubbleSort** which accepts an array and returns a sorted array using selection sort.
4. create a function named **Insertion Sort** which accepts an array and returns a sorted array using selection sort.

3.2 sorting large arrays

1. Read a file and load it into an array named unsortedArray (Take filename as an command line argument).
2. sort the sort the unsortedArray in 1 using Selection ,Bubble and insertion sort.
3. find the time taken by each sort.

4 Reading Tasks

Read about the following topics :

- What is a destructor and what are it's responsibilities?
- What are the class friend functions? What is the difference between class member functions and class friend functions?
- what is operator overloading?