Data Structures and Algorithm Analysis – COP 3530

Module 3 – Programming Assignment

This assignment will access your skills using C++ strings, classes and dynamic arrays. After completing this assignment you will be able to do the following: (1) allocate memory dynamically, (2) implement a default constructor, (3) insert and remove an item from an unsorted dynamic array of records , (4) use the string class member functions, , (5) search an array, (6) change the capacity (size) of a dynamic array, (7)write function and program headers, (8) print the elements an array, and (9)implement a destructor, (10)implement a copy constructor, (11) overload operator+ without chaining and (12) sort the item in an unsorted array using insertion sort **(see pseudocode for insertion sort algorithm on the next page).**

1. **For this assignment you will need the following files which are given:**
    a. The filie "state.h" which contains the declaration of the class "state_class". The class "population_record" is also stored in the file.
    b. The file "state.cpp" which contains the implementation of the class "state_class"
    c. **The file "state_pop_statistics.cpp" contains the main program which you will use to test your program.**
    d. **The file "census2020_data.txt" contains input data for the program.**
2. Comment every item in the private and private areas of the class declarations. Be specific in your choice of words. Consider the following as appropriate comments for some of the items in the class declarations:
    a. Destructor
    b. Copy constructor
    c. sort
    d. State name
    e. State population size
    f. Deletse an item from the dynamic array…
    g. The dynamic array
3. Write the program header for the program "state_pop_statistics.cpp". Your program header should contain the following fields: your name, total points, due date, course, assignment name, professor's name and program description. I have included a complete example in the skeleton, "state_pop_statistics.cpp".
4. Write a function header for each function in the class declaration (see file "state_pop_statics.cpp"). Each function header should be placed above the function implementation; the code that is provided is enough information for you to write correct function headers. Remember, function headers should include the function name, pre-condition, post-condition, and function description.
5. You should submit the files "state_pop_statistics.cpp", state.cpp, and "state.h" to Canvas before the due date and time.
6. **GET STARTED AND SUBMIT YOUR ASSIGNMENT ONTIME. LATE ASSIGNMENTS USUALLY MEAN YOU ARE NOT READY FOR THIS CLASS.**

Psuedocode for insertion sort:

```
//A is the array
//key is the item to be inserted into the array
INSERTION-SORT(A)
   for i = 1 to n
         key = A [i]
         j = i – 1
          while j > = 0 and A[j] > key
                  A[j+1] = A[j]
                  j = j – 1
         End while
         A[j+1] = key
  End for
```