COP 3337 – TEST 3

Spring 2001, Irvine. Do not write on this test paper. Write your answers on the separate answer sheet provided to you. ***Three points on the test are counted towards clear, neat printing.***

```
class Student {
public:
  Student();
  Student(const string & ID, double credits, double gradePts);
  int get_Credits() const;

  void ReadFromFile( ifstream & infile);
  // Given an open input file stream, read a student object
  // from the file

  void Display() const;
  // Display a student on the console

  static int get_InstanceCount();
  // Return the value of s_nInstanceCount
private:
  string m_IdNumber;
  double m_CreditsEarned;
  double m_GradePoints;
  static int s_nInstanceCount;   // Counts the number of active
};  // Student objects in the currently running program.
```

Part 1: Student class

1. Write the implementation of **s_nInstanceCount** that would be placed in the student.cpp file.
2. Write the implementation of **get_InstanceCount()** in the student.cpp file.
3. Show the function prototype for a global function named **CalculateGPA()** that returns a double, and has one input parameter: a constant Student reference. This function must be declared a **friend** of the Student class.

Part 2: StudentCollection Class

```
class StudentCollection {
public:
  vector<int> FindCredits(int cutoff) const;
  // Return a vector of integers that indicate the
  // index positions of all students whose CreditsEarned
  // are greater than the value in the cutoff parameter
private:
  vector<Student> m_vStudents;
};
```

1. Write the implementation of the FindCredits() function.

Part 3:Vectors

Assume the following vector definition:

```
vector<double> rainFall;
```

1. Write a single statement that changes the vector's size to 50.
2. Write a single statement that sorts the vector in ascending order.
3. If a vector's size is 100 and a program begins to insert the 101st item by calling push_back(), the vector will automatically resize itself by copying its contents to a new memory location. How many more items can be inserted into the vector before this copying operation again takes place?