CS 325 – Activity 1

Activity 1 - Written: (5 pts) Submit in Gradescope

Problem 1: Using theta notation determine the theoretical running times of the following algorithms.

a) Algo1

```
1  int Algo1(int n)
2  {
3      int sum = 0;
4      for (int i = n; i > 0; i--) {
5          for (int j = i+1; j <=n; j++) {
6              sum = sum + j;
7              cout << j << " " << sum  << endl;
8          }
9      }
10     return sum;
11 }
```

b) Algo2

```
1  int Algo2(int n)
2  {
3      int i = n;
4      int sum = 0;
5      while (i > 1) {
6          i = i/2;
7          sum = sum + i;
8          cout << i << " " << sum << endl;
9      }
10     return sum;
11 }
```

c) Algo3

```
1  int Algo3(int A[], int B[], int n)
2  {
3      int total = 0;
4      for (int i = 1; i <= n; i++) {
5          for (int j = 1; j <= 5; j++) {
6              total = (A[i]*B[j]) + total;
7              cout << j << " " << total  << endl;
8          }
9      }
10     return total;
```

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Problem 2: The Mode

Statement: Given a list (array) of integers, determine the value of the mode and its frequency. The mode is the value that appears most frequently in a data set.

Input: size of the data set, followed a list of integers in the data set.
Output: value_of_mode frequency
Example

Input:	6
	5 1 5 7 5 2
Output:	5 3

a) Describe an algorithm for finding the mode of a data set.
b) Give pseudocode for your algorithm
c) Analysis of the running time of your algorithm.

Activity 1 – Code: (10 pts)
Implement your algorithm for finding the mode in C++. The "extra credit" test cases have two modes since two different values appear with the greatest frequency. For example,

Input:	8
	9 1 9 7 9 2 7 7
Output:	9 3
	7 3

In the output the mode that appears first in the list should be outputted first. *Note*: That there is a newline (endl) after the output.

You can use the code template I provide. The name of file you submit to Gradescope must be **act1.cpp**. You may submit multiple times. Select all group member each time you submit and include the names of the group member in your comments.