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CS 1713 Exam 2 — Fall 2007

This is a closed book exam. Answer all questions on these sheets. If you need more room, use the back of the last page.

- 1) (10 points) Write a method that has one **String** parameter and returns **true** if the number of **A** characters in the string is greater than the number of **B** characters, and **false** otherwise. Note that this only involves upper case letters.

- 2) (10 points) Write a method that has a two-dimensional array of doubles as a parameter and returns the index of the row containing the largest value. If the largest value appears more than once, you may return the index of any row containing this value. You may also assume that the first row contains at least one element.

3) (20 points)

- a) Write a public method, **linearSearch**, that uses a linear search to find the first position in an array of Strings of a given String. Return -1 if it is not found.
- b) Write a public method, **binarySearch**, that uses a binary search to find a position in an array of Strings of a given String. Return -1 if it is not found. Assume the array is sorted in increasing alphabetical order.

4) (5 points)

- 1) It takes about 10 seconds to search a given array using a linear search. How long would you expect it to take to search an array of five times the size?

- b) It takes about 20 seconds to sort a different array using a selection sort. How long would you expect it to take to sort an array of five times the size?

- c) It takes about 8 seconds to search a sorted array of 1 million elements using a binary search. How long would you expect it to take to search a similar sorted array of 4 million elements? Explain how you got your answer.

5) (20 points) Write a method to sort an array of doubles in increasing order using a selection sort. You may (and it is recommended that you) have your sort method call another method, but you need to write that other method also.

- 6) (7 points) Draw an accurate schematic diagram of the program variables showing the execution of the program.

```
int n = 2;
int m;
int[] x = {10, 30, 50};
int[] y;
int[] z;
m = n;
n = 5;
y = new int[2];
y[0] = m;
y[1] = x[2];
z = y;
z[0] = 27;
```

- 7) (8 points) Suppose **Rectangle** is a class that has been appropriately written. It has a constructor with 2 double parameters, a width and length in this order. Draw an accurate schematic diagram of the program variables showing the execution of the program.

```
double x;  
double y;  
double z;  
Rectangle r1;  
Rectangle r2;  
Rectangle r3;  
r1 = new Rectangle(2.1, 3.3);  
r2 = new Rectangle(4.5, 6.7);  
r3 = r1;  
x = r1.getWidth();  
y = r2.getLength();  
r1.setWidth(15);  
z = r3.getWidth();
```

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- 8) (20 points) The tables below show an array of 8 integers. Fill in each table with a trace of the indicated sort applied to this array. The sort will sort the elements in ascending (increasing) order. Each line in the table should be filled in with the values of the array after one pass through the main loop of the sort. There may be are more lines in the table than needed.

If you make a mistake and would like another copy of the table to fill in, ask for it.

Selection Sort

[illegible]

Insertion Sort

[illegible]