

CS 1713 Final Exam Review Problems

- 1) (10 points) Implement an insertion sort for sorting an array of doubles in increasing order. Do this as follows:
- Write a method called `insertItem` that has 2 parameters. The first parameter is an array of doubles called `list` and the second is an integer called `index`. Assume that the first `index - 1` elements of the array are sorted before the method is called. When the method returns, the element at position `index` has been inserted in the array in its correct position so that the first `index` elements are correctly sorted.
 - Use the `insertItem` method to write a method called `insertionSort` that takes one parameter, an array of doubles, that sorts the array in increasing order.
 - If the method you wrote takes 1 second to sort an array of size 10,000, how long would you expect it to take to sort an array of size 1,000,000? Show how you got your answer.
- 2) (10 points) Suppose `student` is a `Student` and `studentList` is an array of `Student`, where `Student` is a class that implements `Comparable`. Write a code segment that returns the position (index) of the `student` in the array, or -1 if it is not in the array. Assume that the array is already sorted in increasing order. Use a binary search if you can. Otherwise, for half credit, you can use a linear search.

- 3) (10 points) Draw an accurate schematic of the program variables after the following has been executed.

```
int x = 10;
int y = 11;
int z = 12;
int[] a = {2,4,6,8};
int[] b = {1,3,5};
int[] c;
int[] d;
c = b;
d = a;
a[2] = y;
b[1] = 16;
a = new int[2];
a[0] = z;
a[1] = z + 1;
x = d[2];
y = c[1];
```

- 4) (10 points)
- Write a method that takes two parameters, a `char` and an `int`. It prints the first parameter the number of times given by the second parameter.
 - Use the method from part a) to write a code segment to output a triangular pattern of asterisks like the one below. The first row has no leading blanks and the last row contains 2 asterisks. Each row has two fewer asterisks than the preceding row. The variable `rows` contains the number of rows. For `rows = 5` the pattern looks like:

```
*****
*****
*****
****
***
**
```

- 5) (5 points) Given the following declaration:

```
String x[10];
```

Assume that the array has been filled appropriately. Write a code segment to interchange the element with index 8 with the one with index 2. Declare any additional variables that you need to use.

- 6) (10 points)
- Write a method that takes one integer parameters and returns `true` if the integer is divisible by 7 and false otherwise.
 - Write a code segment that declares a 2-dimensional array of `double`s with 100 rows and 200 columns. Now fill the array so that the element at row `r` and column `c` contains 1 if `r+c` is divisible by 7 and -1 otherwise. Use your method from part a). Note that you can do part b) even if you cannot do part a).

