

MACS 261J
2nd Midterm Exam
April 13, 2012

Name: _____

Question:	1	2	3	4	5	6	7	Total
Points:	5	5	5	10	10	10	10	55
Score:								

Question 1 (5 points)

Complete the following method, which returns `true` if and only if the elements of the specified array are sorted in increasing order, such that `a[0] <= a[1] <= ...`

```
public static boolean isSorted(float[] a) {
```

```
}
```

Question 2 (5 points)

Complete the following method, which returns a new array that contains a subset of elements from the specified array, all elements with even indices: `a[0], a[2], a[4], ...`

```
public static float[] subset(float[] a) {
```

```
}
```

Question 3 (5 points)

Many exceptions in Java must be caught. In methods like those above, why are you not required to catch an `ArrayIndexOutOfBoundsException`?

Question 4 (10 points)

Complete the following method, which returns a transposed copy of the specified 2D array of values. Rows in the specified array become columns in the transposed array.

```
public static float[][] transpose(float[][] x) {
```

```
}
```

Question 5 (10 points)

Complete the following methods, each of which returns the maximum value found in a specified array. *Call the first method in your implementation of the second method.*

```
public static float max(float[] a) {
```

```
}
```

```
public static float max(float[][] a) {
```

```
}
```

Question 6 (10 points)

Given the interface specified below for a function $y(x)$, complete the following classes and methods. Include only the minimal amount of code necessary to implement the interface and any necessary constructors.

```
public interface Function {  
    public double y(double x);  
}
```

```
/** A linear function  $y = a*x + b$ . */  
public class Linear implements Function {
```

```
    private double a,b; // constant coefficients  
}
```

```
/** A quadratic function  $y = a*x*x + b*x + c$ .  
public class Quadratic implements Function {
```

```
    private double a,b,c; // constant coefficients  
}
```

```
/** Prints (to console) the value of function f for specified x. */  
public static void print(Function f, double x) {
```

```
}
```

Question 7..... (10 points)

Complete the following method, which computes the square roots of the first **n** whole numbers (1, 2, 3, ..., **n**) and writes the results as **floats** to a binary file with specified **fileName**. (Hint: ensure that the results are actually written to the file, not left in some buffer in memory, before your method returns.)

```
public static void writeSquareRoots(int n, String fileName) {
```

```
}
```

How many bytes will this method write to the binary file?