MACS 261J
2nd Midterm Exam
April 13, 2007 **Name:** _____

Question:	1	2	3	4	5	6	Total
Points:	4	8	12	10	8	8	50
Score:							

Question 1 ..... (4 points)

Write a *single Java statement* that

(a) [2 points] declares and initializes an array of three floats, all equal to `1.0f`.

(b) [2 points] declares and constructs an array of 2 arrays of 3 floats, initially equal to zero.

Question 2 ..... (8 points)

Java has extensive features for handling errors and exceptions.

(a) [2 points] In what ways is a standard Java `Error` the same as an `Exception`?

(b) [2 points] Why would you be more likely to catch an `Exception`?

(c) [2 points] What is special about the standard class `RuntimeException`?

(d) [2 points] After a try block that constructs and reads a `FileInputStream`, why should you catch a `FileNotFoundException` *before* catching an `IOException`?

Question 3 ..... (12 points)

Complete the following methods. Call the first method `sum` in your implementation of the second method `sum`.

```
/**
 * Returns a new array filled with a specified constant.
 * @param n number of floats (array length).
 * @param x the value with which to fill the array.
 * @return the new filled array.
 */
public static float[] fill(int n, float x) {




}

/**
 * Returns the sum of all values in the specified array.
 */
public static float sum(float[] x) {




}

/**
 * Returns the sum of all values in the specified array.
 */
public static float sum(float[][] x) {




}
```

Question 4 ..... (10 points)

Complete the following method to flip an image upside down. For each image pixel `x[i][j]`, assume that `i` is the column index and `j` is the row index. Also assume that every image column contains the same number of pixels.

```
/**
 * Vertically flips a specified image.
 * @param x the image to be flipped; not modified.
 * @return the vertically flipped image.
 */
public static float[][] flipVertical(float[][] x) {









}
```

Question 5 ..... (8 points)

Both *text* and *binary* formats are used to store scientific data in files.

(a) [2 points] List one advantage of the text format.

(b) [2 points] List one advantage of the binary format.

(c) [2 points] List two standard Java classes for use with text files only.

(d) [2 points] List two standard Java classes for use with binary files only.

Question 6 ..... (8 points)

Consider the classes `A` and `B` defined below:

```
public class A {

  public A(int n) {
    this.n = n;
  }

  private int n;
}

public class B {

  public B() {

  }

  public B(float x) {

    this.x = x;
  }

  private float x;
}
```

(a) [2 points] In the class `B`, modify the first constructor so that it calls the second constructor, initializing the float to `1.0f`.

(b) [2 points] Modify the class `B` so that it is a subclass of `A`.

(c) [2 points] In your modification of `B`, the second constructor should call the constructor for `A` with integer value `1`.

(d) [2 points] Inheritance is an important feature of object-oriented programming. Why is it important?