MACS 261J
Final Exam
May 10, 2010 **Name:** _____

Question:	1	2	3	4	5	6	7	8	Total
Points:	5	5	15	10	10	10	25	20	100
Score:									

Question 1 ..... (5 points)

How many *bits* in a Java `byte`?
How many bytes in a Java `int`?
How many bytes in a Java `short`?
How many bytes in a Java `float`?
How many bytes in a Java `double`?

Question 2 ..... (5 points)

Name two Java classes that you would use to read a binary file.

Name a Java exception that you might catch when reading a binary file.

Question 3 ..... (15 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.

```
// Flips the specified image x upside down.
// Returns a new image; does not modify the image x.
public static float[][] flipUpsideDown(float[][] x) {




}
```

Question 4 ..... (10 points)

(a) [5 points] What is printed by the following Java statements?

```
int count = 0;
while (count<5) {
  System.out.println(count);
  ++count;
}
```

(b) [5 points] Rewrite (simplify) the code fragment above using a `for` loop.

Question 5 ..... (10 points)

(a) [5 points] What is printed by the following program fragment?

```
double degC = 100; // at which water at sea level boils
double degF = 9/5*degC + 32;
double degC = degF-32 * 5/9; // hint: 32*5 = 160, 17*9 = 153
System.out.println("degC = "+degC);
System.out.println("degF = "+degF);
```

(b) [5 points] Show how you would fix this program so that it computes and prints the correct (expected) answers.

Question 6 ..... (10 points)

Write a complete Java method that computes and returns the average of a 1D array of `floats`.

Question 7 ..... (25 points)

Implement all methods for the following class:

```
/**
 * A waypoint (geographic location) has a name, latitude and longitude.
 */
public class Waypoint {

  /**
   * Constructs a waypoint with specified name and zero lat and long.
   */
  public Waypoint(String name) {



  }

  /**
   * Sets the location for this waypoint.
   */
  public void setLocation(double latitude, double longitude) {


  }

  /**
   * Gets the name for this waypoint.
   */
  public String getName() {

  }

  /**
   * Gets the latitude for this waypoint.
   */
  public double getLatitude() {

  }

  /**
   * Gets the longitude for this waypoint.
   */
  public double getLongitude() {

  }
```

```
  /**
   * Determines whether this waypoint equals the specified waypoint.
   * Two waypoints are equal if they have the same name and location.
   */
  public boolean equals(Waypoint wp) {



  }

  /**
   * Returns a copy of this waypoint with the specified name.
   * The copy may (or may not) have a different name, but it
   * has the same latitude and longitude as this waypoint.
   */
  public Waypoint copy(String name) {




  }
                                                        // declare
                                                        // private
                                                        // fields
                                                        // here

  /**
   * Using (calling) the methods defined above,
   * (1) constructs a waypoint for a location named "Home",
   * (2) sets the location of the Home waypoint,
   * (3) creates a copy of Home named "Mines", and
   * (4) prints whether waypoints for Home and Mines are equal.
   */
  public static void main(String[] args) {









  }
}
```

Question 8 ..... (20 points)

(a) [10 points] What is printed by the following program?

```
public class PrintsSomething {
  public static int[] method1(int[] x) {
    int n = x.length;
    int[] y = new int[n];
    for (int i=0,j=0; i<n/2; ++i,j+=2)
      y[j] = x[i];
    for (int i=n/2,j=1; i<n; ++i,j+=2)
      y[j] = x[i];
    return y;
  }

  public static int[] method2(int[] x) {
    int n = x.length;
    int[] y = new int[n];
    for (int i=0,j=0; i<n/2; ++i,j+=2)
      y[i] = x[j];
    for (int i=n/2,j=1; i<n; ++i,j+=2)
      y[i] = x[j];
    return y;
  }

  public static void main(String[] args) {
    int[] x = {1,2,3,4,5,6};
    int[] y = method1(x);
    int[] z = method2(y);
    for (int i=0; i<y.length; ++i)
      System.out.print(y[i]);
    for (int i=0; i<z.length; ++i)
      System.out.print(z[i]);
  }
}
```

(b) [5 points] Provide better (more descriptive) names for the first two methods.

(c) [5 points] Describe the intent of the two Java keywords `public` and `static` in the declarations of the methods above.