CSCI 261J
Final Exam
May 6, 2013   **Name:** _____

Question:	1	2	3	4	5	6	7	8	9	10	Total
Points:	5	10	10	15	10	10	5	10	10	15	100
Score:											

Question 1 . . . . (5 points)
   How many *bits* in a Java `byte`?
   How many bytes in a Java `short`?
   How many bytes in a Java `int`?
   How many bytes in a Java `float`?
   How many bytes in a Java `double`?

Question 2 . . . . (10 points)
   Circle and describe all syntax errors in the following program fragment:

```
double value;
double 2ndValue = value;
if (value=2ndValue) {
  System.out.println("equal");
else {
  System.out.println("not equal")
}
```

Question 3 . . . . (10 points)
   In the Java statement

```
public static final float SQRT_THREE = (float)Math.sqrt(3.0);
```

   what is the purpose of

   - the keyword `static`?
   - the keyword `final`?
   - the operator `(float)`?

   Which of these if omitted would cause a syntax (compile) error?

Question 4 . . . . (15 points)

(a) Complete this method, using `drawLine(int x1,int y1,int x2,int y2)` in the Java standard class `Graphics` to draw four line segments that make a 3-by-3 grid, as for the game tic-tac-toe, that fills a panel with specified total width `w` and height `h`. If the `w` and `h` are not equal, then the grid cells need not be square.

```
public void draw3x3Grid(Graphics g, int w, int h) {
```

```
}
```

(b) Complete this method, which is like that above, but draws an n-by-n grid.

```
public void drawNxNGrid(Graphics g, int w, int h, int n) {
```

```
}
```

Question 5 . . . . (10 points)

Complete the following method, to return the median of three specified values.

```
public static double median(double a, double b, double c) {
```

```
}
```

Question 6 . . . . (10 points)
Complete the following method, which returns a new array that contains the
subset `x[1],x[3],x[5],...` of elements from the specified array `x`.

```java
public static float[] subsetWithOddIndices(float[] x) {




}
```

Question 7 . . . . (5 points)
Many exceptions in Java must be caught. In methods like that above, why are
you not required to catch an `ArrayIndexOutOfBoundsException`?

Question 8 . . . . (10 points)
Complete the following methods, each of which returns the sum of values in
a specified array. *Call the first method in your implementation of the second
method.*

```java
public static float sum(float[] a) {




}

public static float sum(float[][] a) {




}
```

Question 9 . . . . (10 points)

(a) Complete the following two methods, which return the indices of the first and last non-zero values in in the specified array.

```
public static int firstNonZero(float[] x) {




}
public static int lastNonZero(float[] x) {




}
```

(b) Complete the following method, which returns a new array that is a copy of the specified array x, but without any leading or trailing zeros. Use the methods above to determine which elements to copy; the length of the returned array is less than or equal to the length of the specified array x.

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




}
```

Question 10 . . . . (15 points)

(a) Write code that defines an interface `Shape` with one method `contains` that, given a `float x` and a `float y`, returns `true`, if the point `(x,y)` lies inside the `Shape`, or `false`, otherwise.

(b) Write code that defines a class `Circle` that correctly implements the interface `Shape`. The class `Circle` has a constructor with three parameters: the center coordinates `x` and `y`, and radius `r`, with corresponding fields.

(c) Write a *complete Java program* that constructs a `Circle` object and then uses that object to determine and print whether or not the point `(5,3)` lies inside.