

MACS 261J
2nd Midterm Exam
April 11, 2008

Name: _____

Question:	1	2	3	4	5	6	7	Total
Points:	3	4	10	7	8	10	8	50
Score:								

Question 1 (3 points)

Describe in words the purpose of this program fragment:

```
double[] xa = {x};  
double[] ya = {y};  
PointsView mv = sp.addPoints(xa,ya);
```

Question 2 (4 points)

Write a *single Java statement* that

- (a) [2 points] declares and initializes an array of two floats, both equal to 3.1f.

- (b) [2 points] declares and constructs an array of 42 arrays of 29 floats, initially equal to zero.

Question 3 (10 points)

Java has many standard classes of errors and exceptions.

- (a) [2 points] Name one standard class that is a subclass of **Error**.

- (b) [2 points] Name one standard class that is a subclass of **Exception**.

- (c) [2 points] You can catch an **Exception**. Can you catch an **Error**?

- (d) [2 points] What is special about the standard class **RuntimeException**?

- (e) [2 points] Why would you catch a **FileNotFoundException** *before* (instead of after) catching an **IOException**?

Question 4 (7 points)

Given a 2D array (an array of arrays) `float[] [] a`, write a program fragment that computes the minimum, maximum, and average value in the array. Do not assume that each array `a[i]` has the same length.

Question 5 (8 points)

Implement the following method as specified:

```
/**
 * Returns the transpose of the specified image. In the transpose,
 * rows become columns and columns become rows. In other words,
 * output y[i][j] = x[j][i], for all image sample indices (i,j).
 * @param x input image.
 * @return output image, the transpose of x.
 */
public static float[] [] transpose(float[] [] x) {
```

```
}
```

Question 6 (10 points)

In the program fragment provided below, ...

- (a) [4 points] Modify the class `LineSegment` so that it is a subclass of `Shape`. (Do not neglect to call the constructor of the superclass `Shape`.)
- (b) [4 points] Add a new subclass `Circle`. The constructor for `Circle` should have three arguments: center coordinates `x` and `y` and the radius `r`.
- (c) [2 points] What attributes do your classes `LineSegment` and `Circle` have in common?

```
public class Shape {  
  
    public Shape(double xc, double yc) {  
        this.xc = xc;  this.yc = yc;  
    }  
  
    private double xc,yc; // coordinates of this shape's center  
}  
  
public class LineSegment {  
  
    public LineSegment(double x1, double y1, double x2, double y2) {  
  
        this.x1 = x1;  this.y1 = y1;  this.x2 = x2;  this.y2 = y2;  
    }  
  
    private double x1,y1,x2,y2; // coordinates of segment endpoints  
}
```

Question 7 (8 points)

For each of the following questions, choose the one best answer.

- (a) [2 points] What is the best definition of a binary file?
 - A. A file that can be read sensibly using any text editor.
 - B. A file whose bytes may contain any pattern of ones and zeros.
 - C. A file that contains only ints, floats, and/or doubles.
 - D. A file that contain no bytes that represent characters.

- (b) [2 points] A program writes ten int values to a new file. How many bytes are in the file?
 - A. Depends on the size of the values in the ints.
 - B. 10
 - C. 20
 - D. 40

- (c) [2 points] Why is it important to always close an output stream?
 - A. To erase all of the data in the file.
 - B. To ensure that all pending output operations are completed.
 - C. To properly initialize the output methods.
 - D. So the garbage collector can reclaim memory used by the stream.

- (d) [2 points] To read binary doubles from a FileInputStream, we should construct a
 - A. FileReader
 - B. InputStream
 - C. DataInputStream
 - D. BufferedInputStream