CS 211	Computers and Programming	Handout xx
	Fall 1998	
	Prelim I	October 15th, 1998

You have one hour to do this exam.
All programs in this exam must be written in Java.

```
Name: ________________________________________

Id:   _________________
```

1. (20 points)

   (a) (8 points)Is this a legal Java program? If your answer is yes, what does it print? If your answer is no, explain in two or three sentences what the problem is.

   ```
   class Puzzle {
    public void Move(char c) {
    }
    public static void main(String[] args) {
     Puzzle[] ps = new Puzzle[10];
     ps[0].Move('N');
    }
   }
   ```

(b) (12 points) Is this a legal Java program? If your answer is yes, what does the program print when executed? If your answer is no, explain in two or three sentences what the problem is.

```
class test {
    public static void main(String[] args){
      int[] A = new int[2];
      A[0] = 3;
      A[1] = A[0];
      A[1] = 4;
      System.out.println(A[0]);

      int[][] B = new int[2][2];
      B[1] = B[0];
      B[1][0] = 78;
      System.out.println(B[0][0]);
    }
}
```

2. (20 points) Scarlett O'Java has written the following program.

```
class main {

  public static void main(String[] args) {
   B ob = new B();
   System.out.println(ob.foo());
   System.out.println(ob.s());
  }
}

class A {
  protected String foo() {
    return "mello " + s();
  }
  private String s () {
    return "yellow";
  }
}

class B extends A {
  protected String s () {
    return "jello";
  }
}
```

(a) (5 points) Explain in two or three sentences the difference between *overloading* and *overriding* of methods in Java.

(b) (15 points) What does Scarlett's program print? Explain your answers briefly.

3. (20 points) Write a Java public instance method named `kahuna` that takes an array of integers as input and returns the largest integer in this array. Excessively convoluted code will be penalized.

4. (20 points) Answer the following questions.

   (a) (2 points) How can you introduce subtypes in Java?

   (b) (4 points) What relationship must there be between the type of an object and the type of a reference to that object?

   (c) (3 points) How many supertypes can a Java type have?

   (d) (3 points) Is it possible to change the type of an object by using a `cast`?

   (e) (3 points) What advantage is there in permitting the type of an object to be different from the type of a reference to that object?

   (f) (5 points) Explain the term "dynamic binding" in two or three sentences.

   Let `r` be a reference of type `foo`. Consider the invocation `r.do()`. What checks does the compiler perform to make sure this invocation is reasonable? Explain how the method to be invoked (`do`) is found at runtime.