The purpose of this short assignment is to get you thinking about Java and to recall some aspects of assembly language programming. This assignment should be completed on your own. Write your solutions on this handout, and be sure to add your name at the top of this page.

1. (4 points) Consider the following Java class.
   ```java
class Beta {
    public Beta b;
    public void test(int x) {
    }
}
```
For each of the following show how to write the declaration assuming it is placed in the box shown above or explain why the declaration cannot be made (in each case the box is empty initially).
(a) Declare a local variable b of type int with initial value 1
(b) Declare a local variable x of type Beta with initial value null
(c) Declare a local variable Beta of type int with initial value 1
(d) Declare a local variable b of type Beta with initial value b

2. (4 points) In the space provided on the flip side of this page, write a machine code program using MIPS assembly (or some informal machine code of your choice) that implements the Java program fragment below, in which n is a nonnegative integer. In your code, values of n and s should be held in registers you choose. Try to implement the loop so it performs one jump per iteration for all but the first iteration. A description of the MIPS instruction set is available on the class web page (strict adherence to MIPS assembly syntax is not needed).
```java
int s = 0;
while (n != 0) {
    s += n;
    n--;
}
```
3. **(4 points)** Consider the following Java code.

```java
interface I1 {double x = Math.random();}
class T1 implements I1 {double x = Math.random();}
class T2 extends T1 {private double x = Math.random();}
class T3 extends T1 {
    double x = Math.random();
    void show() { System.out.println( ); }
}
class Test {
    public static void main(String[] args) {
        new T3().show();
    }
}
```

For each of the four occurrences of identifier `x` above, give an expression to be placed in the box in method `show()` to print the value of the specified instance of `x`, or argue it cannot be accessed.

(a) `x` in `I1` :

(b) `x` in `T1` :

(c) `x` in `T2` :

(d) `x` in `T3` :

(space for problem 2 solution)