

CS 100 Exercise 14: Pass by... Polymorphism!

Summer 2001

Due in lecture, Wednesday August 1

Name: _____ CUid: _____

Read the following code. Then, on the back of this sheet, **draw a class hierarchy** that includes classes **One**, **OnePrime**, and **OnePrimePrime** (the boxes should include variables and methods!). Then, **show the output** that would be produced if you set the Target to Ex14.

```
class One {
    protected int value = 1;
    public int getVal() { return value; }
    public void increment() { value++; }
}
class OnePrime extends One {
    public int getVal() { return value + super.getVal(); }
}
class OnePrimePrime extends OnePrime {
    public int getVal() { return value + super.getVal(); }
    public void increment() { value += 2; }
}

public class Ex14 {
    public static void printSum(One[] a) {
        int sum = 0;
        for (int i=0; i<a.length; i++)    sum += a[i].getVal();
        System.out.println("The sum is " + sum + "\n");
    }
    public static void doSum(One[] a) {
        a = new One[1];
        a[0] = new OnePrime();
        int sum = 0;
        for (int i=0; i<a.length; i++)    sum += a[i].getVal();
        System.out.println("The new sum is " + sum + "\n");
    }

    public static void main(String[] args) {
        One[] array = new One[3];
        array[0] = new One();
        array[1] = new OnePrime();
        array[2] = new OnePrimePrime();

        for (int i=0; i<array.length; i++)
            System.out.println(i + " is " + array[i].value);
        System.out.println();
        printSum(array);

        array[0].increment();
        array[0].increment();
        array[2].increment();

        for (int i=0; i<array.length; i++)
            System.out.println(i + " is " + array[i].value);
        System.out.println();
        printSum(array);

        doSum(array);
        printSum(array);
    }
}
```