

Software Quality Assurance (WS 10/11)

Problem Set 3 *Due Wednesday, December 8th, 2010*

Given is the function ALL_POSITIVE implemented in Java.

```
1 boolean ALL_POSITIVE(int[] array) {
2     boolean result;
3     int i,len,tmp;
4     len = array.length;
5     i=0;
6     result=true;
7     while (i<len&&result) {
8         tmp=array[i];
9         if (tmp<=0)
10            result=false;
11        i++;
12    }
13    return result;
14 }
```

Problem 1: Data Flow Oriented Test

- Please create a control flow diagram with data flow annotation for the function ALL_POSITIVE.
- Please determine the minimal necessary test path for fulfilling the *all defs* criterion of the ALL_POSITIVE function. Please denote the required test path and mark this path in the control flow diagram.
- Please determine the minimal necessary test path for fulfilling the *all c-uses* criterion for the ALL_POSITIVE function. Please denote the required test path and mark this path in the control flow diagram.
- Please determine the minimal necessary test path for fulfilling the *all p-uses* criterion for the ALL_POSITIVE function. Please denote the required test path and mark this path in the control flow diagram.
- Please determine the minimal necessary test path for fulfilling the *all c-uses/some p-uses* criterion for the ALL_POSITIVE function. Please denote the required test path and mark this path in the control flow diagram.

Hint:

format for Def-Use-pair

(<def-node, ..., c-use-node>, variable)

Or

(<def-node, ... ,p-use-node1,p-use-node2>,variable)

Problem 2: Path Coverage Test

- a) Please determine the minimal necessary test cases for fulfilling the structured path coverage test for the parameter $k=1$ for the ALL_POSITIVE operation.
- b) Please determine the minimal necessary test cases for fulfilling *the boundary interior test* for the ALL_POSITIVE operation.