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AG Software Engineering: Dependability

Software Quality Assurance
(WS 08/09)

Problem Set 3

Due Thursday, December 4th, 2008

Given is the function `ALL_POSITIVE` implemented in Java.

```
boolean ALL_POSITIVE(int[] array) {
  boolean result;
  int i,len,tmp;
  len = array.length;
  i=0;
  result=true;
  while (i<len&&result) {
    tmp=array[i];
    if (tmp<=0)
      result=false;
    i++;
  }
  return result;
}
```

Problem 1: Data Flow Oriented Test

a) Please create a control flow diagram with data flow annotation for the function ALL_POSITIVE.
b) 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.
c) 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.
d) 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.
e) 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-note, …, c-use-note>, variable)
Or
(<def-note, ... ,p-use-note1,p-use-note2>,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.