Problem Sheet 11: Testing
Sample Solutions

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1 Branch and Path Coverage

i. (a) 4.
   (b) 6.

ii. (a) Yes, e.g. function(4,6) and function(6,4).
    (b) Yes, e.g. \(x := 1, x := 0, \text{ and } x := -1\).

iii. (a) 3.
     (b) 10.

iv. (a) \(z := \text{true} \rightarrow \text{result} := "b"\)
    (b) \(y := x + x \ (\rightarrow \ y := y + 2)^n \text{ for } 0 \leq n \leq 6\).

v. Yes in both cases. A path is a feasible execution path: we can always execute all of them.
   (a) For full path coverage we add the test function(1,2).
   (b) For full path coverage we add the tests: \(x := 2, x := 3, \ldots x := 8\).

2 Predicate Coverage

i. (a) \(x < y \text{ and } z \&\& x + y == 10\).
    (b) \(x > 0, y < 15, \text{ and } x = 0\).

ii. Yes: we can use the same tests as we used for branch coverage (this definition of predicate coverage is equivalent).

3 Clause Coverage

i. (a) \(x < y, z, \text{ and } x + y == 10\).
    (b) \(x > 0, y < 15, \text{ and } x = 0\).

ii. Yes in both cases.

   (a) For full clause coverage we can use the tests function(4,6) and function(1,2).
   (b) For full clause coverage we can use the tests \(x := 1, x := 0, \text{ and } x := -1\).

*Solution sheet adapted from an earlier version by Stephan van Staden.