

Homework 7

Note: You may collaborate on the assignment. If you do collaborate on the assignment, list your collaborators. All duplicate assignments without collaborators listed will be flagged for plagiarism. Additionally, presenting others work – including a Chegg expert answer – as your own work *is* a violation of the academic dishonesty policy.

This homework assignment is designed to prepare you for the in class quiz. For the following graph:

Problem 1: Consider the graph:

```
N = { 1, 2, 3, 4, 5, 6 }
N0 = { 1 }
Nf = { 6 }
E = { (1,2), (1,6), (2,3), (2,5), (3,4), (4,5), (4,1), (5,1) }
def(1) = def(4) = use(4) = use(6) (assume use of x at 4 precedes the def)
```

- (a) Draw the Graph
- (b) List all of the du-paths with respect to x. (Note: Include all-du-paths, even those that are subpaths of some other du-path).
- (c) Determine which du-paths each test path tours. Write them in a table with test paths in the first column and the du-paths they cover in the second column. For this part of the exercise, you should consider both direct touring and sidetrips.
- (d) List a minimal test set that satisfies all defs coverage with respect to x. (Direct tours only.) Use the given test paths.
- (e) List a minimal test set that satisfies all uses coverage with respect to x. (Direct tours only.) Use the given test paths.
- (f) List a minimal test set that satisfies all-du-paths coverage with respect to x. (Direct tours only.) Use the given test paths.

Problem 2: Consider the graph:

```
N = { 1, 2, 3, 4, 5 }
N0 = { 1 }
Nf = { 5 }
E = { (1,2), (1,5), (2,3), (3,4), (3,5) }
def(1) = def(3) = use(2) = use(4) = use(5)
```

- (a) Draw the Graph
- (b) List all of the du-paths with respect to x. (Note: Include all-du-paths, even those that are subpaths of some other du-path).
- (c) Determine which du-paths each test path tours. Write them in a table with test paths in the first column and the du-paths they cover in the second column. For this part of the exercise, you should consider both direct touring and sidetrips.
- (d) List a minimal test set that satisfies all defs coverage with respect to x. (Direct tours only.) Use the given test paths.
- (e) List a minimal test set that satisfies all uses coverage with respect to x. (Direct tours only.) Use the given test paths.
- (f) List a minimal test set that satisfies all-du-paths coverage with respect to x. (Direct tours only.) Use the given test paths.

Problem 3: Use the following program fragment for questions ae below.

```
int a = b
if( c < 100 ) {
    c = a + b
    b++
}
else if (b > a) {
    a = 2*a
}
else{
    d = 100
}

if (d < 0) {
    d = b - a
}
e = c + d
```

- (a) Draw a control flow graph for this program fragment.
- (b) Which nodes have defs for variables?
- (c) Which nodes have uses for variables?
- (d) List all of the du-paths.
- (e) Apply all-defs coverage. List the: test requirements, test paths.
- (f) Apply all-uses coverage. List the: test requirements, test paths.
- (g) Apply all-du-paths coverage. List the: test requirements, test paths.