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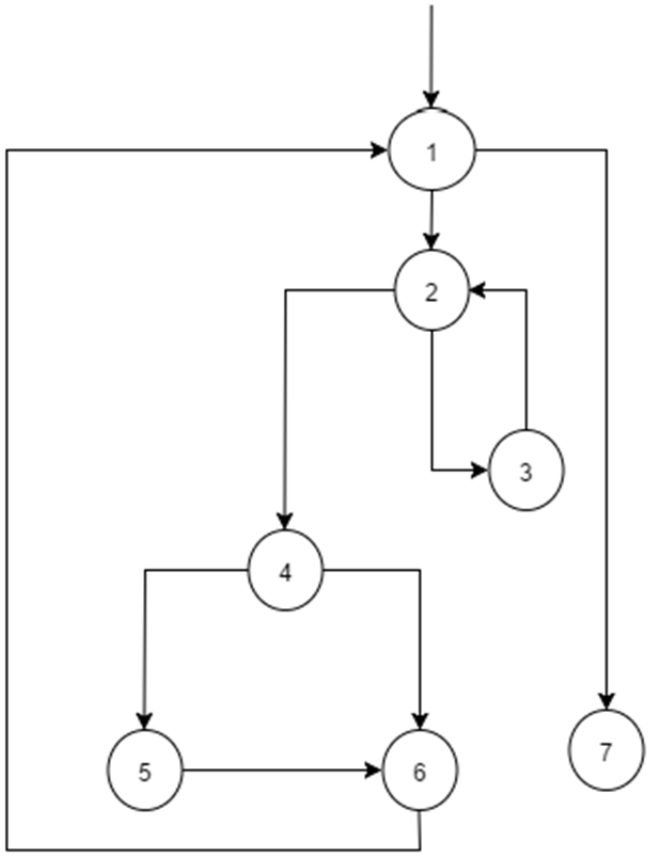
1. **Q5 from Chapter 2, Section 2.2.1, page 43 of your textbook.**

**a)**




b)

| | Test Requirement (TR) |
|---|---|
| A | [1,2,3] |
| B | [1,2,4] |
| C | [2,3,2] |
| D | [2,4,5] |
| E | [2,4,6] |
| F | [3,2,3] |
| G | [3,2,4] |
| H | [4,5,6] |
| I | [4,6,1] |
| J | [5,6,1] |
| K | [6,1,2] |
| L | [6,1,7] |

c)

$t_0$ = [1,2,4,5,6,1,7] covers B, D, H, J, L

$t_1$ = [1,2,3,2,4,6,1,7] covers A,C, G, E, I, L

Edge pair TRs' F[3,2,3] and K[6,1,2] are not toured by any of the test paths.

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d)
The test path does not tour the simple path [3, 2, 4, 5, 6] directly. It tours with a sidetrip [4, 6, 1, 2, 4].

e)
Node Coverage test requirements = {1, 2, 3, 4, 5, 6, 7}
Edge coverage requirements = {(1, 2,), (1, 7), (2, 3), (2, 4), (3, 2), (4, 5), (4, 6), (5, 6), (6, 1)} .
Prime path coverage requirements =

1. [1,2,4,6,1] ,
2. [1,2,4,5,6,1] ,
3. [2,3,2],
4. [2,4,6,1,2],
5. [2,4,5,6,1,2] ,
6. [3,2,3],
7. [3,2,4,6,1,7],
8. [3,2,4,5,6,1,7],
9. [4,5,6,1,2,4] ,
10. [4,5,6,1,2,3] ,
11. [4,6,1,2,4] ,
12. [4,6,1,2,3] ,
13. [5,6,1,2,4,5],
14. [6,1,2,4,5,6] ,
15. [6,1,2,4,6] ,

f)
Test path [1,2,3,2,4,5,6,1,7] fulfills node coverage , but does not cover (4,6) .

g)
[1,2,3,2,4,5,6,1,7] , [1,2,4,6,1,7] covers Edge coverage requirement A-L, but does not cover PPC requirement 6,9,10,11,12,13,14,15 .

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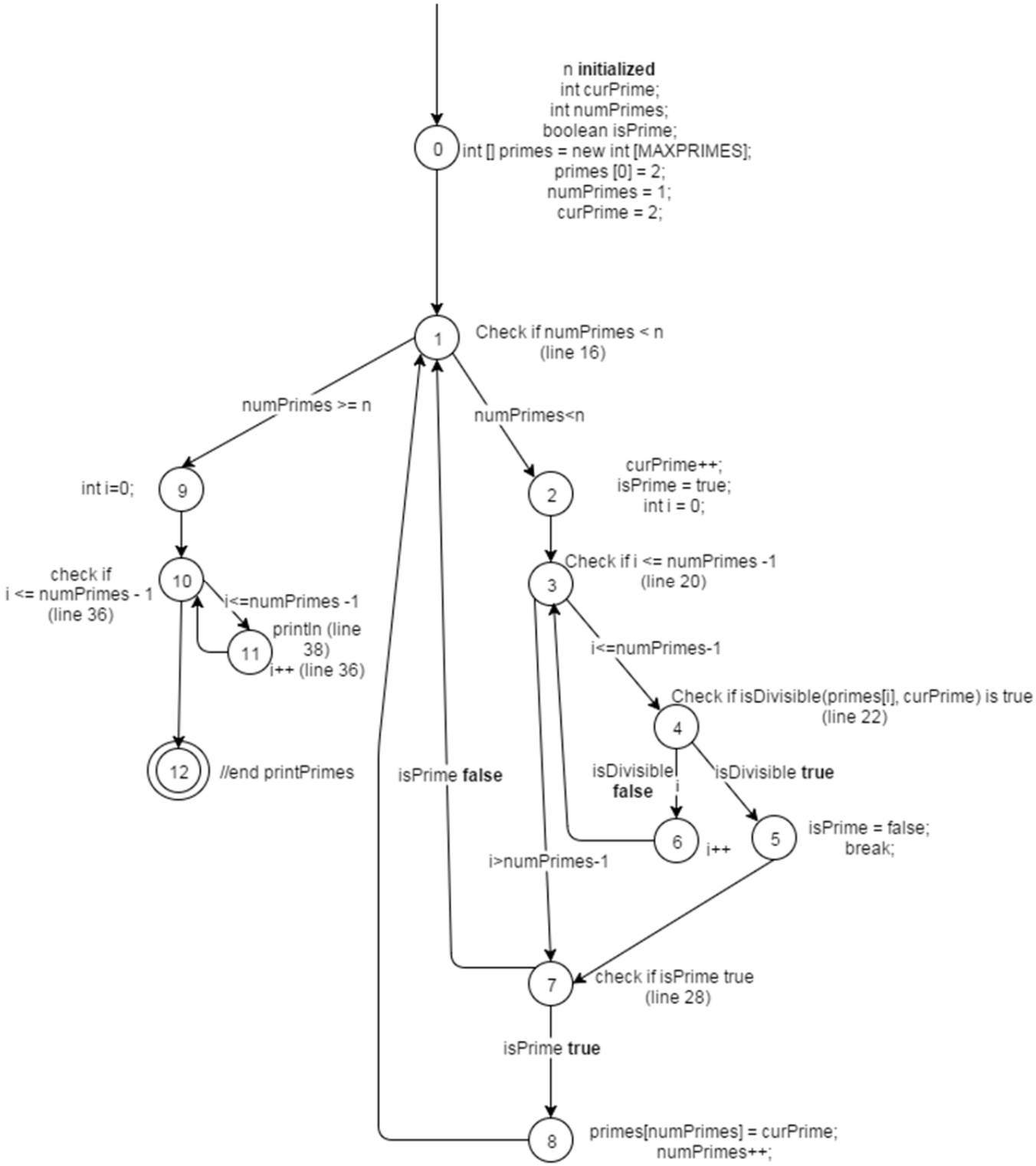
## 2. Q7 from Chapter 2, Section ~~2.2.3~~ 2.3, pp. 63-65 of your textbook.

**a)**



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b)
line 16, replace while(numPrimes < n) with while(numPrimes < 3) . This would be detected by n = 3 but not by n = 5.

c)
For test case n = 1, the body of the while loop is skipped.

d)
Node coverage TR = {0,1,2,3,4,5,6,7,8,9,10,11,12}
Edge coverage TR = {
(0,1),
(1,2),
(2,3),
(3,4),
(4,5),
(4,6),
(6,3),
(3,7),
(5,7),
(7,8),
(7,1) ,
(8,1),
(1,9),
(9,10),
(10,11),
(11,10),
(10,12)
}

Prime Path coverage TR ={
[0,1,2,3,4,5,7,8],
[0,1,2,3,7,8],
[0,1,2,3,4,6],
[0,1,9,10,11],
[0,1,9,10,12],
[1,2,3,4,5,7,8,1],
[1,2,3,4,5,7,1],
[1,2,3,7,8,1],
[1,2,3,7,1],
[10,11,10],
[11,10,12],
[11,10,11],
[2,3,4,5,7,8,1,9,10,12],
[2,3,4,5,7,8,1,9,10,11],
[2,3,4,5,7,1,9,10,11],
[2,3,4,5,7,1,9,10,12],

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[2,3,7,8,1,9,10,12],
[2,3,4,5,7,8,1,2],
[2,3,7,8,1,9,10,11],
[2,3,4,5,7,1,2],
[2,3,7,1,9,10,12],
[2,3,7,1,9,10,11],
[2,3,7,8,1,2],
[2,3,7,1,2],
[3,4,5,7,8,1,2,3],
[3,4,5,7,1,2,3],
[3,7,8,1,2,3],
[3,7,1,2,3],
[3,4,6,3],
[4,6,3,7,8,1,9,10,11],
[4,6,3,7,8,1,9,10,12],
[4,5,7,8,1,2,3,4],
[4,6,3,7,1,9,10,12],
[4,6,3,7,1,9,10,11],
[4,5,7,1,2,3,4],
[4,6,3,7,8,1,2],
[4,6,3,7,1,2],
[4,6,3,4],
[5,7,8,1,2,3,4,5],
[5,7,8,1,2,3,4,6],
[5,7,1,2,3,4,6],
[5,7,1,2,3,4,5],
[6,3,4,5,7,8,1,9,10,11],
[6,3,4,5,7,8,1,9,10,12],
[6,3,4,5,7,1,9,10,12],
[6,3,4,5,7,1,9,10,11],
[6,3,4,5,7,8,1,2],
[6,3,4,5,7,1,2],
[6,3,4,6],
[7,8,1,2,3,4,5,7],
[7,1,2,3,4,5,7],
[7,8,1,2,3,7],
[7,1,2,3,7],
[8,1,2,3,4,5,7,8],
[8,1,2,3,7,8],
}

e)
[0,1,2,3,4,6,3,4,5,7,8,1,9,10,11,10,12] does not achieve edge coverage but achieves node coverage.

f)
test path [0,1,2,3,7,1,2,3,4,6,3,4,5,7,8,1,9,10,11,10,12] tours all edges,
test path [0,1,2,3,7,9,1,2,3,4,6,3,4,5,7,8,9,1,10,11,12,11,13] tours all the edges, but does not cover prime path [0,1,9,10,12] .

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**3. Using your code from A1, measure code coverage in the form of statement, branch, and method coverage using any Java code coverage analysis tool of your choice.**

| Counter | Coverage | Covered | Missed | Total |
|---|---|---|---|---|
| Instructions | 89.9 % | 753 | 85 | 838 |
| Branches | 99.0 % | 101 | 1 | 102 |
| Lines | 89.2 % | 165 | 20 | 185 |
| Methods | 77.8 % | 14 | 4 | 18 |
| Types | 100.0 % | 3 | 0 | 3 |
| Complexity | 92.8 % | 64 | 5 | 69 |