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CSE 4321 Homework 4

Section 7.2.2

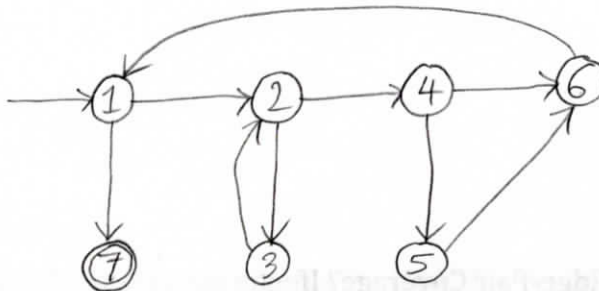
5. Answer questions a–g for the graph defined by the following sets:

- $N = \{1, 2, 3, 4, 5, 6, 7\}$
- $N_0 = \{1\}$
- $N_f = \{7\}$
- $E = \{(1, 2), (1, 7), (2, 3), (2, 4), (3, 2), (4, 5), (4, 6), (5, 6), (6, 1)\}$

Also consider the following (candidate) test paths:

- $p_1 = [1, 2, 4, 5, 6, 1, 7]$
- $p_2 = [1, 2, 3, 2, 4, 6, 1, 7]$
- $p_3 = [1, 2, 3, 2, 4, 5, 6, 1, 7]$

(a) Draw the graph.



(b) List the test requirements for Edge-Pair Coverage. (Hint: You should get 12 requirements of length 2.)

$\{[(1, 2), (2, 3)],$
 $[(1, 2), (2, 4)],$
 $[(2, 4), (4, 5)],$
 $[(2, 4), (4, 6)],$
 $[(4, 5), (5, 6)],$
 $[(5, 6), (6, 1)],$
 $[(6, 1), (1, 7)],$
 $[(2, 3), (3, 2)],$
 $[(3, 2), (2, 3)],$
 $[(3, 2), (2, 4)],$
 $[(6, 1), (1, 2)],$
 $[(4, 6), (6, 1)]]\}$

(c) Does the given set of test paths satisfy Edge-Pair Coverage? If not, state what is missing.

No, these Edge-Pairs weren't covered by the test paths

$\{[(3, 2), (2, 3)],$
 $[(6, 1), (1, 2)]]\}$

(d) Consider the simple path [3, 2, 4, 5, 6] and test path [1, 2, 3, 2, 4, 6, 1, 2, 4, 5, 6, 1, 7]. Does the test path tour the simple path directly? With a sidetrip? If so, write down the sidetrip.

NO. The test path DOES NOT tour the simple path directly.

YES. The test path DOES tour the simple path with a sidetrip.

{(3, 2, 4),
(4, 5, 6)}

node Coverage {1, 2, 3, 4, 5, 6, 7}

Edge Coverage {(1, 2), (1, 7), (2, 3), (3, 2), (2, 4), (4, 5), (4, 6), (5, 6), (6, 1)}

Prime Path Coverage

(e) List the test requirements for Node Coverage, Edge Coverage, and Prime Path Coverage on the graph.

length = 0	length = 1	length = 2	length = 3	length = 4	length = 5	length = 6
[1]	[1, 2]	[1, 2, 3] !	[1, 2, 4, 5]	[1, 2, 4, 5, 6]	[1, 2, 4, 5, 6, 1]*	[3, 2, 4, 5, 6, 1, 7]!
[2]	[1, 7] !	[1, 2, 4]	[1, 2, 4, 6]	[1, 2, 4, 6, 1]*	[3, 2, 4, 5, 6, 1]	
[3]	[2, 3]	[2, 3, 2]*	[3, 2, 4, 5]	[3, 2, 4, 5, 6]	[3, 2, 4, 6, 1, 7]!	
[4]	[3, 2]	[3, 2, 3]*	[3, 2, 4, 6]	[3, 2, 4, 6, 1]	[2, 4, 5, 6, 1, 2]*	
[5]	[2, 4]	[3, 2, 4]	[2, 4, 5, 6]	[2, 4, 5, 6, 1]	[4, 5, 6, 1, 2, 3]*	
[6]	[4, 5]	[2, 4, 5]	[2, 4, 6, 1]	[4, 5, 6, 1, 2]	[4, 5, 6, 1, 2, 4]*	
[7] !	[4, 6]	[2, 4, 6]	[4, 5, 6, 1]	[4, 5, 6, 1, 7] !	[5, 6, 1, 2, 4, 5]*	
	[5, 6]	[4, 5, 6]	[4, 6, 1, 2]	[4, 6, 1, 2, 3]!	[6, 1, 2, 4, 5, 6]*	
	[6, 1]	[4, 6, 1]	[4, 6, 1, 7] !	[4, 6, 1, 2, 4]*	[2, 4, 5, 6, 1, 7]!	
		[5, 6, 1]	[5, 6, 1, 2]	[5, 6, 1, 2, 3] !		
		[6, 1, 2]	[5, 6, 1, 7] !	[5, 6, 1, 2, 4]		
		[6, 1, 7] !	[6, 1, 2, 3] !	[6, 1, 2, 4, 5]		
			[6, 1, 2, 4]	[6, 1, 2, 4, 6]*		
				[2, 4, 6, 1, 2]*		
				[2, 4, 6, 1, 7] !		

(f) List test paths from the given set that achieve Node Coverage but not Edge Coverage on the graph.

Test path p_3 achieved Node Coverage but not Edge Coverage because edge (4, 6) isn't covered in p_3 .

(g) List test paths from the given set that achieve Edge Coverage but not Prime Path Coverage on the graph.

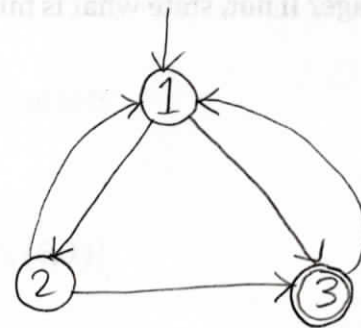
None of the test paths from the given set achieve Edge Coverage.

7. Answer questions a-d for the graph defined by the following sets:

- $N = \{1, 2, 3\}$
- $N_0 = \{1\}$
- $N_f = \{3\}$
- $E = \{(1, 2), (1, 3), (2, 1), (2, 3), (3, 1)\}$

Also consider the following (candidate) paths:

- $p_1 = [1, 2, 3, 1]$
- $p_2 = [1, 3, 1, 2, 3]$
- $p_3 = [1, 2, 3, 1, 2, 1, 3]$
- $p_4 = [2, 3, 1, 3]$
- $p_5 = [1, 2, 3, 2, 3]$



(a) Which of the listed paths are test paths? For any path that is not a test path, explain why not.

p_2 and p_3 are test paths
 p_1 is NOT a test path because the last state in p_1 is 1 and 1 is NOT a final state in this graph.
 p_4 is NOT a test path because the first state in p_4 is 2 and 2 is NOT an initial state in this graph.

(b) List the eight test requirements for Edge-Pair Coverage (only the length two subpaths).

$\{[(1, 2), (2, 1)],$
 $[(1, 2), (2, 3)],$
 $[(2, 3), (3, 1)],$
 $[(3, 1), (1, 2)],$
 $[(3, 1), (1, 3)],$
 $[(2, 1), (1, 3)],$
 $[(2, 3), (3, 1)],$
 $[(1, 3), (3, 1)]\}$

(c) Does the set of **test** paths from part (a) above satisfy Edge-Pair Coverage? If not, state what is missing.

Yes.

(d) Consider the prime path $[3, 1, 3]$ and path p_2 . Does p_2 tour the prime path directly? With a sidetrip?

$$p_2 = [1, 3, 1, 2, 3]$$

p_2 does NOT tour prime path $[3, 1, 3]$ directly, but it does tour prime path with a sidetrip since edge $(3, 1)$ and $(1, 3)$ are toured in test path p_2 and prime path.