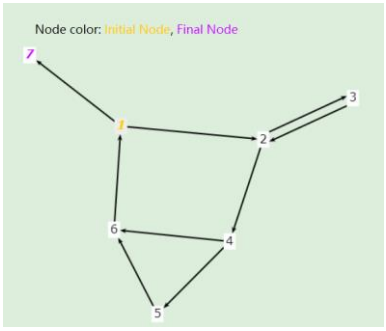
HW4

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.)

The edge pairs are: { [1, 2, 3], [1, 2, 4], [2, 3, 2], [2, 4, 5], [2, 4, 6], [3, 2, 3], [3, 2, 4], [4, 5, 6], [4, 6, 1], [5, 6, 1], [6, 1, 2], [6, 1, 7] }

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

No. None of the given test paths tour the following edge-pairs: {[3, 2, 3], [6, 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.

Not directly. Yes, with sidetrip [2, 4, 6, 1, 2]. *(It is also possible to use sidetrip:* [4, 6, 1, 2, 4]*)*

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

NC: {1, 2, 3, 4, 5, 6, 7}
EC: {(1, 2), (1, 7), (2, 3), (2, 4), (3, 2), (4, 5), (4, 6), (6, 1), (5, 6)}
PPC: {[1, 2, 4, 5, 6, 1], [1, 2, 4, 6, 1], [2, 4, 6, 1, 2], [2, 4, 5, 6, 1, 2], [3, 2, 4, 6, 1, 7], [3, 2, 4, 5, 6, 1, 7], [4, 6, 1, 2, 4], [4, 5, 6, 1, 2, 4], [4, 6, 1, 2, 3], [4, 5, 6, 1, 2, 3], [5, 6, 1, 2, 4, 5], [6, 1, 2, 4, 6], [6, 1, 2, 4, 5, 6], [3, 2, 3], [2, 3, 2]}

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

p_3 *(does not cover edge* (4, 6)*)*

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

$\{p_1,\ p_2\}$ *or* $\{p_2,\ p_3\}$

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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.

Answer: p_2 and p_3 are test paths. p_1 does not terminate at a final node. p_4 does not start at an initial node. p_5 includes an edge that does not exist in the graph $(3,2)$.

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

Answer: The edge pairs are:

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

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

Answer: No. Neither p_2 nor p_3 tours either of the following edge-pairs:

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

As discussed in (part a), the remaining candidate paths are not test paths.

(d) Consider the prime path [3, 1, 3] and path p_3. Does p_3 tour the prime path directly? With a sidetrip?

Answer: p_3 does not directly tour the prime path. However, p_3 does tour the prime path with the sidetrip $[1,2,1]$.