Communications and Transport Systems
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TNSL20 - basic logistic algorithms

Homework Set 4, 2017

Solutions are due October 10, 2017.

Question 1 (IMPLEMENTATION): Implement the algorithm that tests if a given set of vertices I is an independent set for a given graph $G = (V, E)$ using the adjacency matrix of the graph.
Pseudocode of the algorithm is as follows:

Algorithm 1: Test for independence

Input : Adjacency matrix A, set of vertices I
Output: Boolean value t (true if I is an independent set and false otherwise)

```
1  Function is_independent_set (A, I)
2      t := true;
3      if length(I) > 1 then
4          for v_index = 1 TO length(I)−1 do
5              v := I[v_index];
6              for w_index = v_index + 1 TO length(I) do
7                  w := I[w_index];
8                  if A[v][w] == 1 then
9                      t := false;
10                 end
11             end
12         end
13     end
14     return t;
15 end
```

Test your code on the adjacency matrix obtained from the Homework 2 Question 3 (b).

Question 2 (IMPLEMENTATION): Combine code from Homework 2 Question 3 and Homework 4 Question 1 in order to get a code that works with E and n as an input.

Algorithm 2: Test for independence

Input : Edges E, number of vertices n, set of vertices I

Output: Boolean value t (true if I is an independent set and false otherwise)

```
1 Function is_independent_set_without_adjacency_matrix (E, n, I)
2     A := adjacency_matrix (E, n) ;        // algorithm from HW2 Q3
3     t := is_independent_set (A, I) ;      // algorithm from HW4 Q1
4     return t;
5 end
```