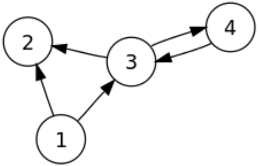
In-degree / Out-degree

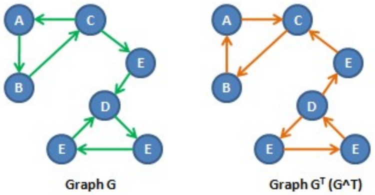


Given an adjacency-matrix representation of a directed graph, how long does it take to compute the out-degree of every vertex? How long does it take to compute the in-degrees?

Exercise: Please re-do and re-think the above exercise for adjacency list representation.

What does the following statement mean?

Given directed graph $G = (V, E)$: $G^T = (V, E^T)$, where
$E^T = (v, u) \in V \times V : (u, v) \in E$
This is called transpose of the graph

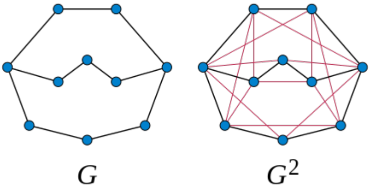


Graph G and its transpose G^T

Exercise: Describe efficient algorithms for computing G^T from G for both representations. Also, compute their complexities.

Square of a Graph

The square of a directed graph $G = (V, E)$ is the graph $G^2 = (V, E^2)$ such that $(u, v) \in E^2$ if and only if G contains a path with at most two edges between u and v.



Describe efficient algorithms for computing G^2 from G for both the adjacency list and adjacency-matrix representations of G. Analyze the running times of your algorithms.

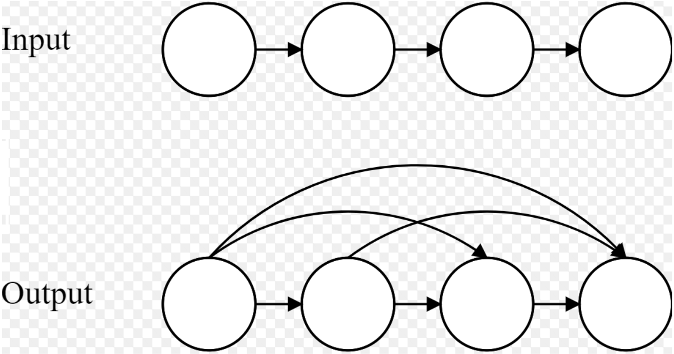
Cube of a Graph

Based on the definition of square of a graph, how will you define cube of a graph?

Any idea how to compute cube of a graph?Cost? Homework!

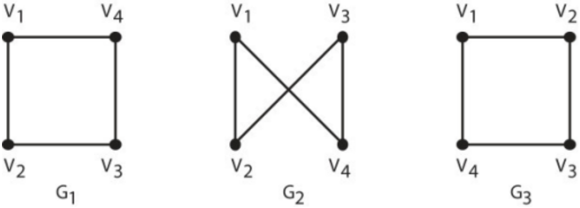
Exercise: Design an algorithm to compute Reachibility Matrix or Transitive Closure of a graph.

Transitive Closure



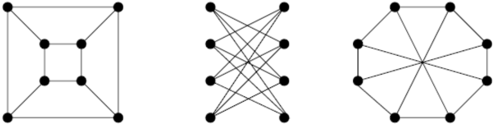
Isomorphic Graphs

Two graphs which contain the same number of graph vertices connected in the same way are said to be isomorphic.



Isomorphic Graphs

Are the following graphs isomorphic?



G_1 G_2 G_3

Homework...

Please go through Chapter 22 of your textbook.