Finding popular nodes

Help Center

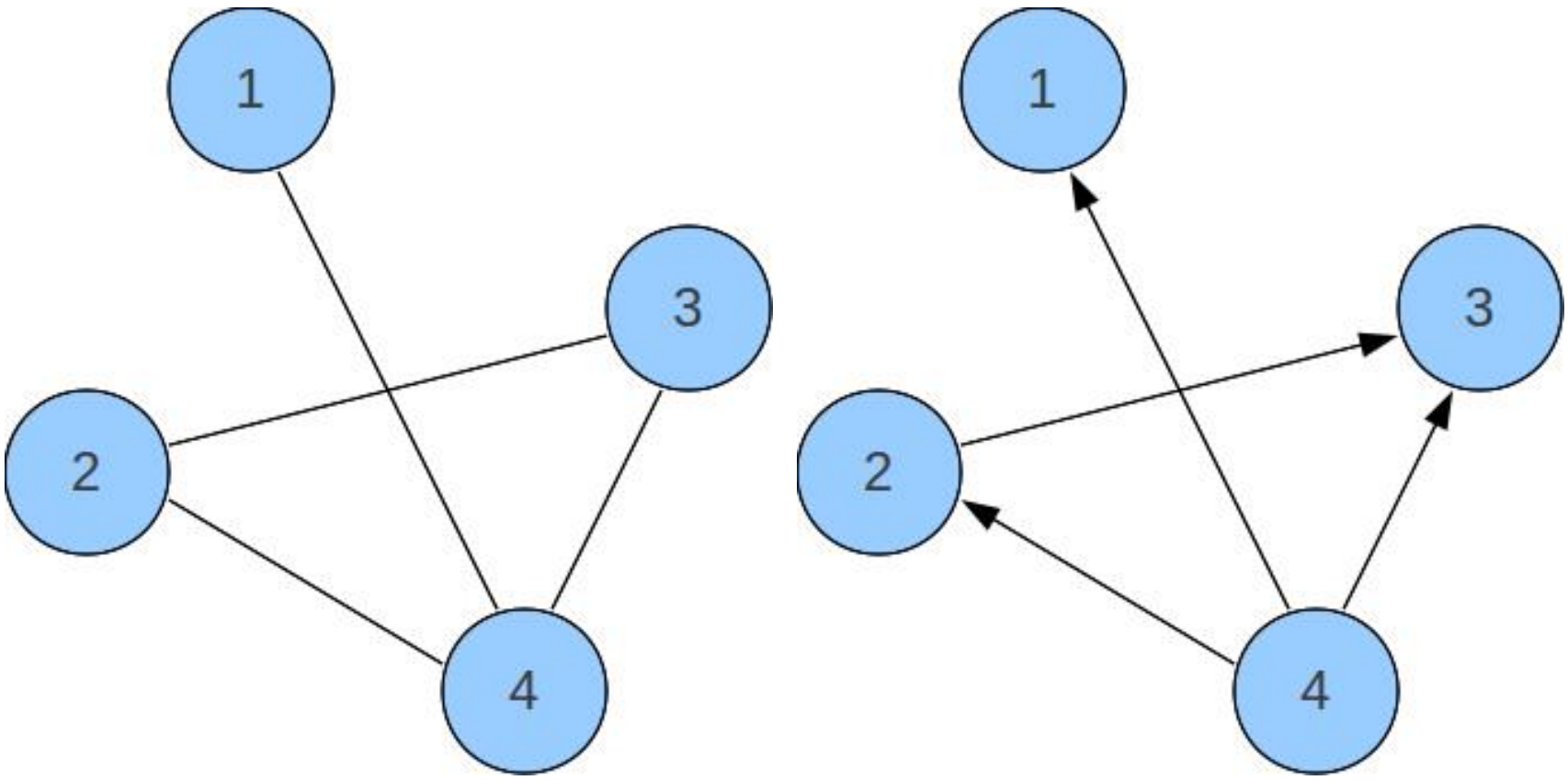
This exercise is from a Comp 182 lab session. You can find the solution here.

In many problems, it is important to be able to find nodes in a graph that have higher degree than other nodes. Such popular nodes are interesting in many contexts:

- These nodes are central to the page rank algorithm used to find "important" web pages.
- In a social network, these nodes represent people who are most likely to spread gossip quickly.
- In an epidemiological network, these nodes represent people who are most likely to spread disease quickly.
- In the internet, these nodes are the most likely to be disruptive to connectivity if they fail (or are attacked).

Simply expressed, we are looking for the set of nodes in a graph that have higher degree than the average degree of the entire graph. This can be applied to undirected or directed graphs (using in-degree).

Example graphs:



For the undirected graph above, the average degree is two. Therefore, the node 4 is popular since its degree 3. For the directed graph, the average in-degree is one. Therefore, the node 3 is popular.

Your task for this exercise is to do the following:

- Write some pseudo-code for finding popular nodes in undirected graphs. You will need to be careful various factors of two that arise in your pseudo-code. Once you are satisfied with your attempt, feel free to consult our pseudo-code.
- Implement this pseudo-code in Python. You may want to use your solution to the "Undirected graphs" activity.

- Once your code is implemented and test, use this code to load these examples with the following URLS:
  - http://storage.googleapis.com/codeskulptor-alg/random10.txt
  - http://storage.googleapis.com/codeskulptor-alg/random100.txt
  - http://storage.googleapis.com/codeskulptor-alg/random1000.txt
  - http://storage.googleapis.com/codeskulptor-alg/random10000.txt

  Once you loaded one of these examples, test your code on the provided graphs. As hint, the 100 node example has 45 popular nodes.

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