UNIVERSITY of SOUTH FLORIDA

CAP 4773 / 6317 Social Media Mining, Fall 2020

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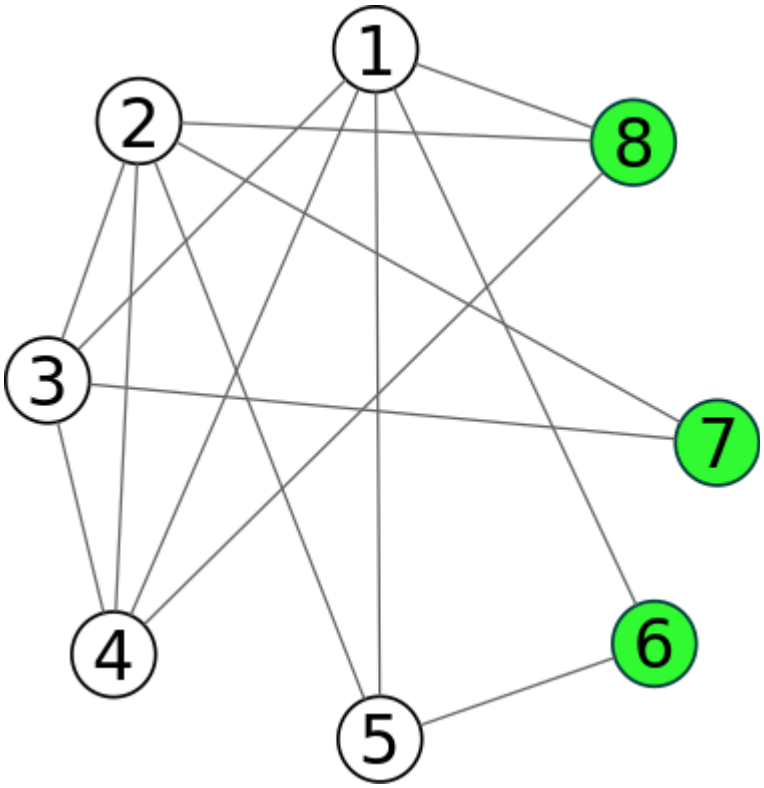
Warm-up Problem

This assignment does not count toward your final grade.

The graph below represents a social network of n=8 people. In this population, some nodes are “active” (colored in green) and some are inactive (colored in white). In this configuration, all “inactive” nodes observe that no more than half of their neighbors are “active”.



Assume that you can swap the color of any two nodes, e.g. if node 4 is inactive and node 8 is active, you can swap the colors so that node 4 becomes active and node 8 inactive; however, you cannot change the edges nor the number of active nodes.

Answer the questions below.

Questions

1. Can you find a configuration in which all “inactive” nodes observe that at least half of their neighbors are “active”? If so, draw the new network below.
2. What is the degree of the active nodes in the new configuration? Has it increased or decreased from before?
3. Is the configuration you found the only possible one?
4. Are you aware of any real-world situation where this paradox could be at play? Describe it in your own words.