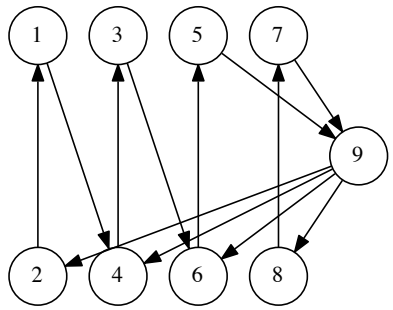
Internet Analytics (COM-308)

Homework Set 3

Exercise 1: Rewiring the Graph

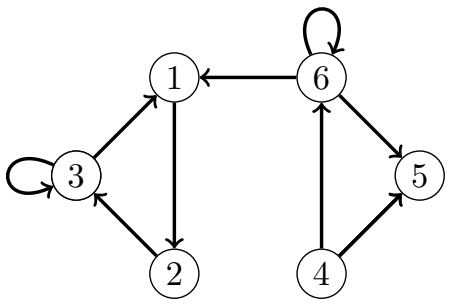


Consider the graph shown on the left, and suppose that you want to maximize the PageRank of node 9. For this, you get to change the head (to) (but *not* the tail (from)) of any **two** edges of the graph. Sketch the new graph, and give a short explanation about your solution (numerical PageRank values are not necessary.)

Exercise 2: Computing PageRank Scores

In this exercise, we construct the Google matrix and explore the impact of θ on the PageRank score.

(a) Compute the Google Matrix G_g of the graph given below, for $\theta = \{0.9, 1.0\}$.



Graph g

(b) Compute the PageRank vector π of the graph g by solving the equation $x(I - \theta H) = a$. Set a to uniform distribution over all the nodes. Feel free to rely on a tool such as matlab, octave, or mathpy to solve the resulting system of equations.

What qualitative observations can you make about π for different values of θ?