Social Networks
Solution to Homework 2

Q1. [10] Exercise #1 ([EK], pp 349)

Consider the set of 18 Web pages drawn in Figure 13.8, with links forming a directed graph. Which nodes constitute the largest strongly connected component (SCC) in this graph? Taking this as the giant SCC, which nodes then belong to the sets IN and OUT defined in Section 13.4? Which nodes belong to the tendrils of the graph?
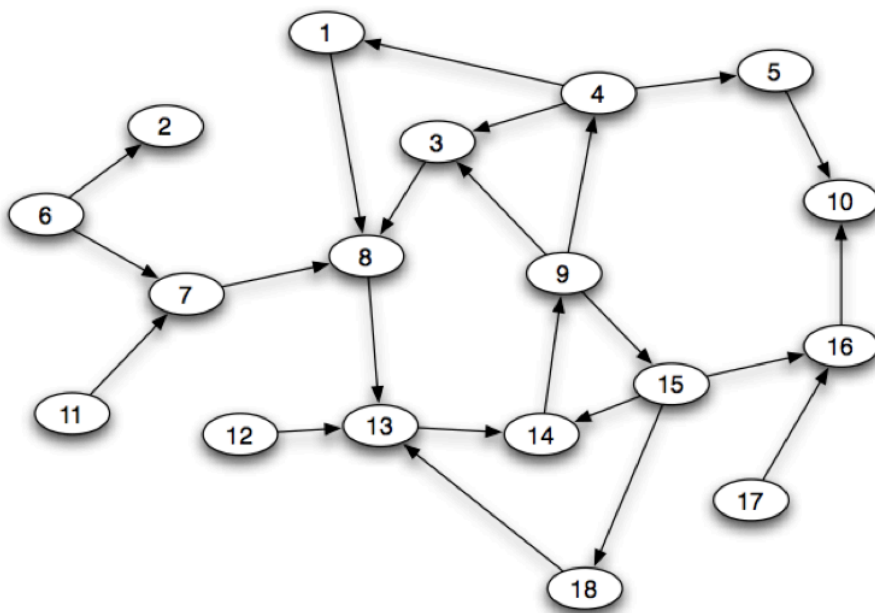

Figure 13.8: A directed graph of Web pages.

Answer:

Nodes constitute the largest SCC: 1, 3, 4, 8, 9, 13, 14, 15, 18
Nodes belong to sets IN: 6, 7, 11, 12
Nodes belong to sets OUT: 5, 10, 16
Nodes belong to tendrils of the graph: 2, 17

Q2. [10] Exercise #5 ([EK], pp 382)

Figure 14.21 depicts the links among 6 Web pages, and also a proposed PageRank value for each one, expressed as a decimal next to the node. Are these correct equilibrium values for the Basic PageRank Update Rule? Give a brief (1-3 sentence) explanation for your answer.
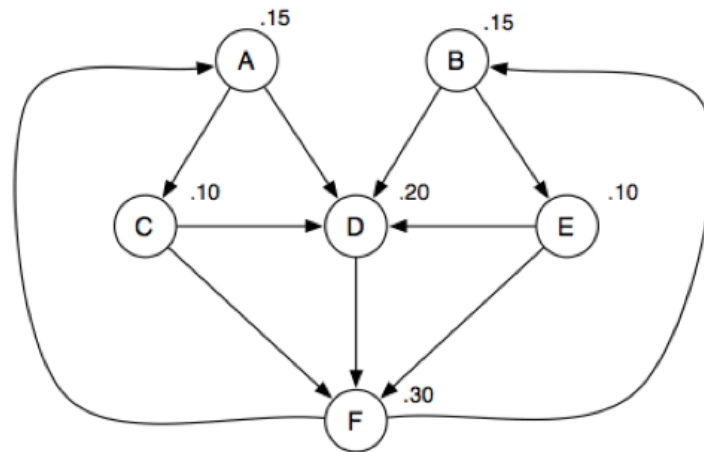

Figure 14.21: A collection of 6 Web pages, with possible PageRank values.

Answer:

These are not correct equilibrium values for the Basic PageRank Update Rule. To form an equilibrium set of PageRank values, the summation of these values should equal to 1 and when we apply the Basic PageRank Update Rule, we get the same value back. Node C receives 0.075 from A but gives out 0.10. Node D receives 0.25 but gives out 0.20. Node E receives 0.075 from B but gives out 0.10.