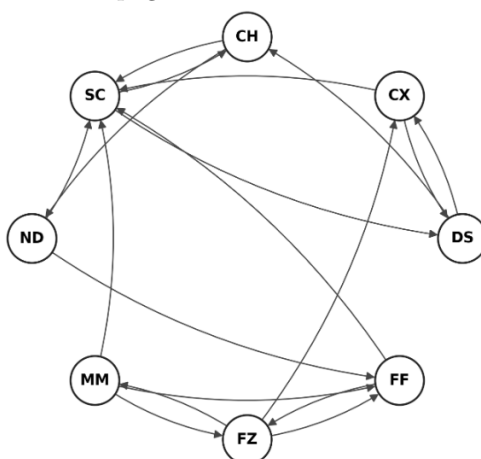


PROBLEM 1 (PAGERANK EXPLORATION) Here is a directory of the eight ice cream pages.

Code	Site	What it is	In-links	Out-links
SC	The Scoop	ice cream review blog, running since 1998		
DS	Dairy Science Digest	food-science site, rigorous, posts rarely		
CH	Churn	independent review site		
ND	Nondairy Now	non-dairy ice cream, new		
FF	FlavorFeed	aggregator; reposts everyone's content		
FZ	Freezer Notes	home-churning hobbyist blog		
MM	Meltdown	ice cream memes		
CX	The Codex	volunteer reference wiki		

Here is the web of links between these pages.



- (a) Fill in the in-links and out-links above. Then, using that information, and whatever other criteria you'd like, list the three websites you'd like to see first, in order. Name your criteria.

- (b) PageRank, when run on this graph, gives the following outcome:

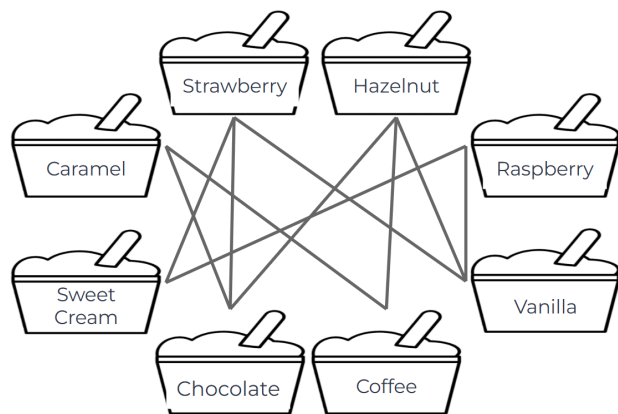
$$SC(.24) > CH(.19) > DS(.17) > CX(.11) > ND(.10) > FF(.09) > FZ(.07) > MM(.04).$$

Why does ND, which has one in-link, beat FF, which has three in-links?

- (c) You run ND, and you're unhappy with this outcome. What is an easy way for Google to tweak the pseudocode to make it a little easier for new websites like yours to get traction?

PROBLEM 2 (PROJECT PRACTICE) Below, you have received two figures. First is the set of ice cream flavors. A line between two ice cream flavors means that they can be made into a cone. Below, we have provided a table of all similar pairs, with their similarity penalty listed.

Remember, **your goal is to create a menu of cones that uses every flavor exactly once but minimizes the total similarity penalty between cones on the menu.**



Pair 1	Pair 2	Similarity Penalty
Strawberry + Vanilla	Raspberry + Sweet Cream	9
Strawberry + Sweet Cream	Raspberry + Vanilla	8
Caramel + Coffee	Chocolate + Hazelnut	4
Chocolate + Caramel	Coffee + Hazelnut	2
Strawberry + Chocolate	Caramel + Coffee	2
Vanilla + Hazelnut	Caramel + Coffee	2
Vanilla + Hazelnut	Raspberry + Sweet Cream	2
Strawberry + Chocolate	Raspberry + Sweet Cream	1

For example, here is the worst possible menu:

- strawberry+vanilla,
- raspberry+sweet cream,
- caramel+coffee,
- chocolate+hazelnut.

The first and second cones incur a penalty of 9, and the third and fourth cones incur a penalty of 4. Therefore, the total penalty of this configuration is 13. What is the best menu you can find?