CSC303: Practice Questions II

Rise of the New Practice Set

We'll be covering solutions in-tutorial on March 17th

Question 1: Recall the product diffusion process described in class. Recall that each node using product A has a reward of a per neighbour also using A, and that each node using product B has a reward of b per neighbour also using B.

Assume that we change our model so that mismatching neighbours each get a reward of $c < a, b$. For a node u using B, what proportion of u's neighbours must be using A for it to be non-detrimental for u to switch?

Question 2: In class we saw how to represent SIS using SIR. In tutorial you will be seeing the SEIR model. In the SEIR model, when a node is infected, is spends t_E timesteps in a non-infectious "exposed" state before transitioning to the infectious state.
How can you represent SEIR as a SIR model with $t_E = 1$? Assume the SEIR contact network is directed.

Question 3: Consider the problem of decentralized search. Assume that instead of only providing a node with it's neighbours and their grid-distance to the target, we also provide a node with their neighbours' weak links. How could you improve the decentralized search heuristic with this information?

Question 4: Assume you run a fast food restaurant. The sales of your products roughly follow a power law distribution. To take advantage of bulk purchases, you would like to maximize the inequality in the sales distribution. How could you do this?

Question 5: Compute the structural virality of a graph consisting of a node u_0 with n children, $u_1, \ldots u_n$.

Question 6: Describe a graph which is not a social network (i.e., the nodes cannot be people or similarly intelligent entities such as companies), but where triadic closure could be argued to be applicable.