

Exercises 3

These questions are meant to help you with preparation – as a guide to what sort of problems you might face in the exam. They are harder than actual exam questions. Try to solve them yourself first before looking at solutions.

Exercise 0.1. *Is the min-category distance a metric? (Prove your answer)*

Exercise 0.2. *Remember that modularity can be computed for any subset of vertices. Draw a graph and highlight a subset of vertices that have negative modularity.*

Exercise 0.3. *Draw a directed graph that has cycles, but the unscaled pagerank will cause all “value” to accumulate at a single node. Is it possible to construct such an example where the graph is strongly connected?*

* **Exercise 0.4.** *For what value of $p = o(1)$ in an ER graph do you think number of triads will be at least $\Omega(n)$.*

Exercise 0.5. *Draw a random graph on 16 nodes. Find its 4 core. Now draw it in such a way that it has exactly 2 connected component in the 4 cores, but the components do not contain any clique of size 4 or more. [Comment: I do not know if this is possible. But take a shot! If it is not possible, that is interesting in itself.]*

Exercise 0.6. *Suppose you have medical data of patients (test reports, age, weight etc), along with what kind of disease they had. How would you construct a network from this data and how would you make use of it?*