

Exercises - Home project 2

Symmetries of graphs are studied using automorphisms. Automorphism is an isomorphism from a graph to itself.

Graph Γ is **asymmetric** if it has only a trivial automorphism, i.e. identity map (mapping each vertex to itself). Surprisingly, almost all graphs are asymmetric.

Partial automorphism is an isomorphism between any two induced subgraphs Γ_1, Γ_2 (of the same order) of Γ . A rank of a partial automorphism is given by the size of its domain.

Each graph has some nontrivial partial automorphism. Why (answer for yourself)? Suppose there are several nontrivial partial automorphisms of Γ . We will denote by $k_{max}(\Gamma)$ the largest rank out of all nontrivial partial automorphisms of Γ .

We define the following measure of asymmetry, **asymmetric depth** d of a graph Γ with n vertices is defined as the $d(\Gamma) := n - k_{max}(\Gamma)$. Your task is to implement algorithm that will get on input graph in networkx and output its asymmetric depth.