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Graphs & Algorithms II — Exercise Set 12 — HS08

URL: http://www.ti.inf.ethz.ch/ew/courses/GA08/

Exercise 35

Let G be a tournament on n vertices, given as an $n \times n$ adjacency matrix A. Show that one can find the sink—if it exists—by querying $O(n)$ entries of A only.

Exercise 36

Let $\mathbb{F}$ be a finite field and $k \in \mathbb{N}$. Prove that one can test with $q = O(k + \varepsilon^{-1})$ queries (evaluations) whether a function $f : \mathbb{F} \to \mathbb{F}$ is a polynomial of degree at most k.

Exercise 37

A graph G on n vertices is ε-far from being connected if at least εn edges need to be added to G in order to make it connected.

Let G be a graph, given as an adjacency list for each vertex. Show that one can test using $O(\varepsilon^{-3})$ queries whether G is connected.

Homework 12

For some $\gamma > 0$, a graph $G = (V, E)$ is said to be γ-*far* from being triangle-free if one needs to change (add or remove) more than $\gamma\binom{|V|}{2}$ edges in G to make it triangle-free.

Show that for every $\gamma > 0$ there is a $\delta = \delta(\gamma)$ such that any graph $G = (V, E)$ which is γ-far from being triangle-free contains at least $\delta\binom{|V|}{3}$ triangles.

Homework due: 11.12.2008, 11:00AM.