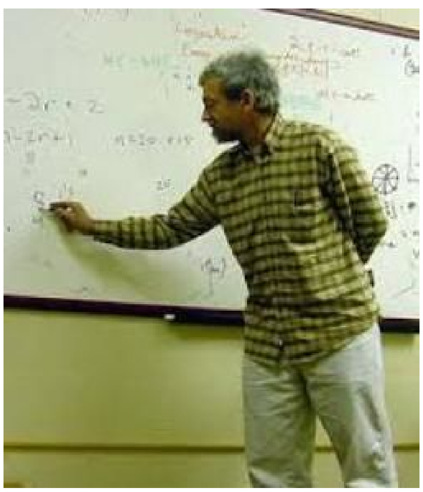
VCU Discrete Mathematics Seminar

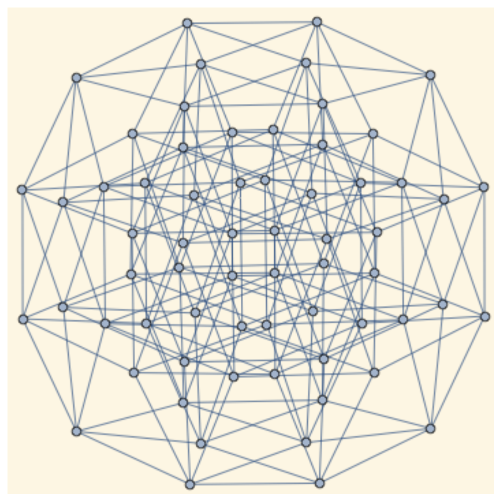
Inducibility in the Hypercube

Prof John Goldwasser
(West Virginia University)

Wednesday, Apr. 23
1:00-1:50 EDT

In person! in 4145 Harris Hall. And on Zoom:
`https://vcu.zoom.us/j/92975799914`
`password=graphs2357`





Let Q_d be the hypercube of dimension d and let H and K be subsets of its vertex set $V(Q_d)$, called configurations in Q_d. We say that K is an exact copy of H if there is an automorphism of Q_d which sends H onto K. Let H be a configuration in Q_d and let $n \geqslant d$ be an integer. We let $\lambda(H, d, n)$ be the maximum, over all configurations A in Q_n, of the fraction of sub-d-cubes R of Q_n in which $A \cap R$ is an exact copy of H, and we define the d-cube density $\lambda(H, d)$ of H to be the limit as n goes to infinity of $\lambda(H, d, n)$.

We have determined $\lambda(H, d)$ for 11 of the 14 configurations in Q_3 (and have lower bound constructions close to flag algebra upper bounds for the others) and several of the 238 configurations in Q_4, as well as for an infinite family of configurations. There are strong connections with the inducibility of graphs. We also have some recent results with Alon and Axenovich on determining $\lambda(d, s)$, the limit as n goes to infinity of the maximum fraction, over all subsets A of the vertices of a large n-cube, of sub-d-cubes which have precisely s vertices in A.