What is an Explicit Construction?

Bill Gasarch

University of Maryland, College Park, MD, US
gasarch@cs.umd.edu

Thread one:

Probabilistic Arguments are often called non-explicit since they show that an object exists without showing how to construct it. One example: the Van Der Waerden number $W(k,2) \geq \Omega(2^{k/2})$ can be shown by an easy prob argument.

Thread two:

A classic result in derandomization is that, if you assume certain HARDness assumptions that are well believed, then $\mathbf{P} = \mathbf{BPP}$. These proofs rely on lemmas that say HARDness assumptions yield psuedorandom generators.

Knitting the two threads together:

We show that, assuming HARDness assumptions, one can show that many non-explicit lower bounds in Ramsey Theory can be made explicit.

In addition:

We prove a general theorem that yields many lower bounds and a k-CNF-SAT result that are non-explicit and then use our KNITTING result to obtain that HARDness implies they are explicit.