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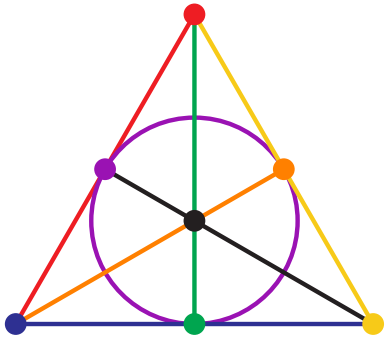
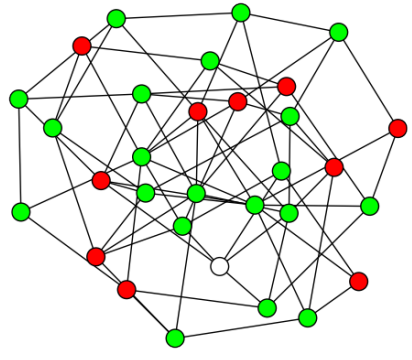
I combine **satisfiability solvers** with **computer algebra systems** to construct large combinatorial objects—or provide computer-certifiable proofs of their nonexistence. My work has resulted in...

- The first certificates for *Lam's problem*, proving the nonexistence of a projective plane of order ten.
- The first Hadamard matrices constructed via Williamson matrices in many orders, including $4 \cdot 70$ and 2^k for all $k \geq 8$.
- A new lower bound on the size of a Kochen–Specker system.





In practice, the **SAT+CAS** approach gives exponential speedups, e.g., improving the search for 21-vertex KS graphs by a factor of over 30,000.