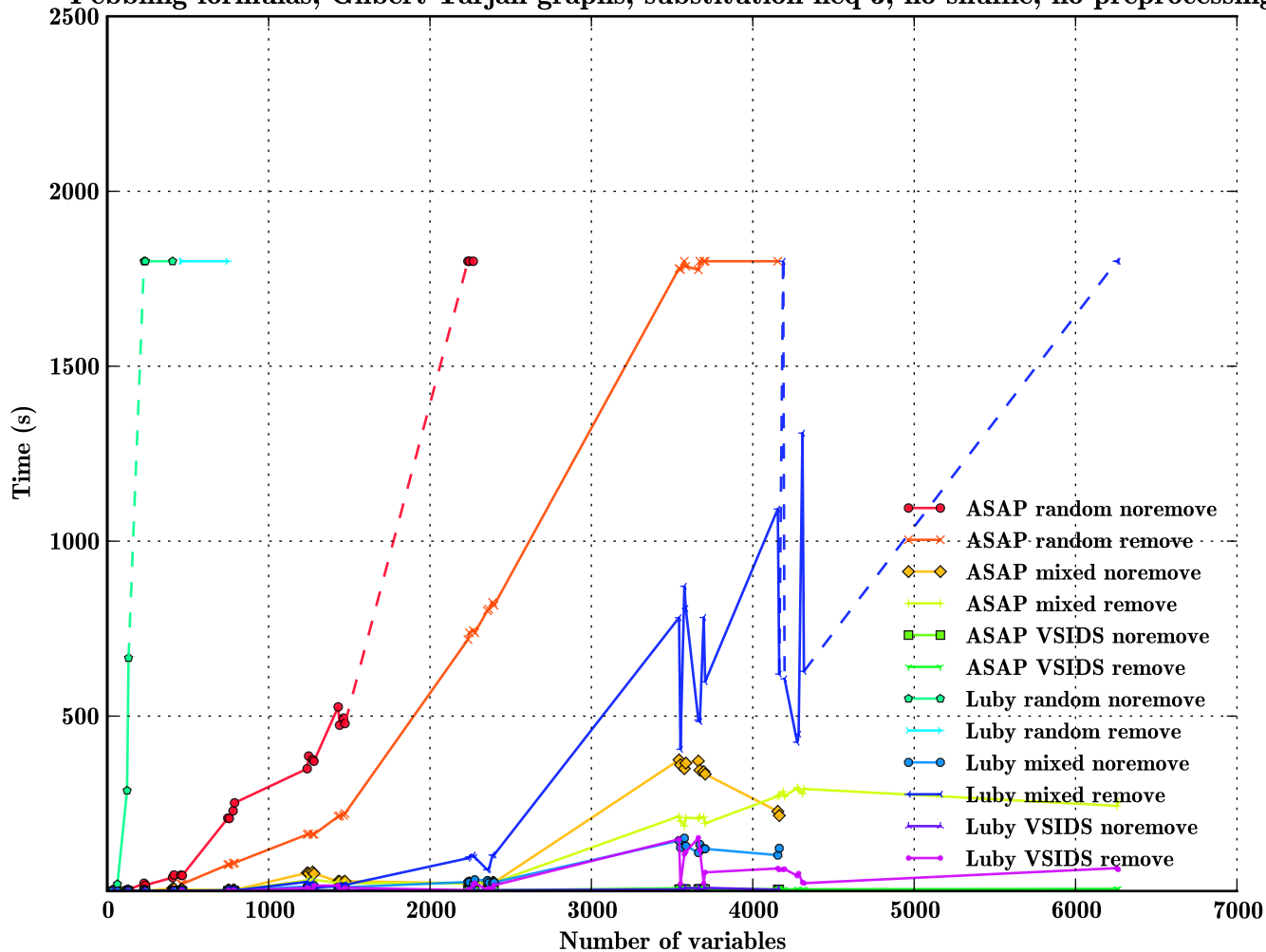
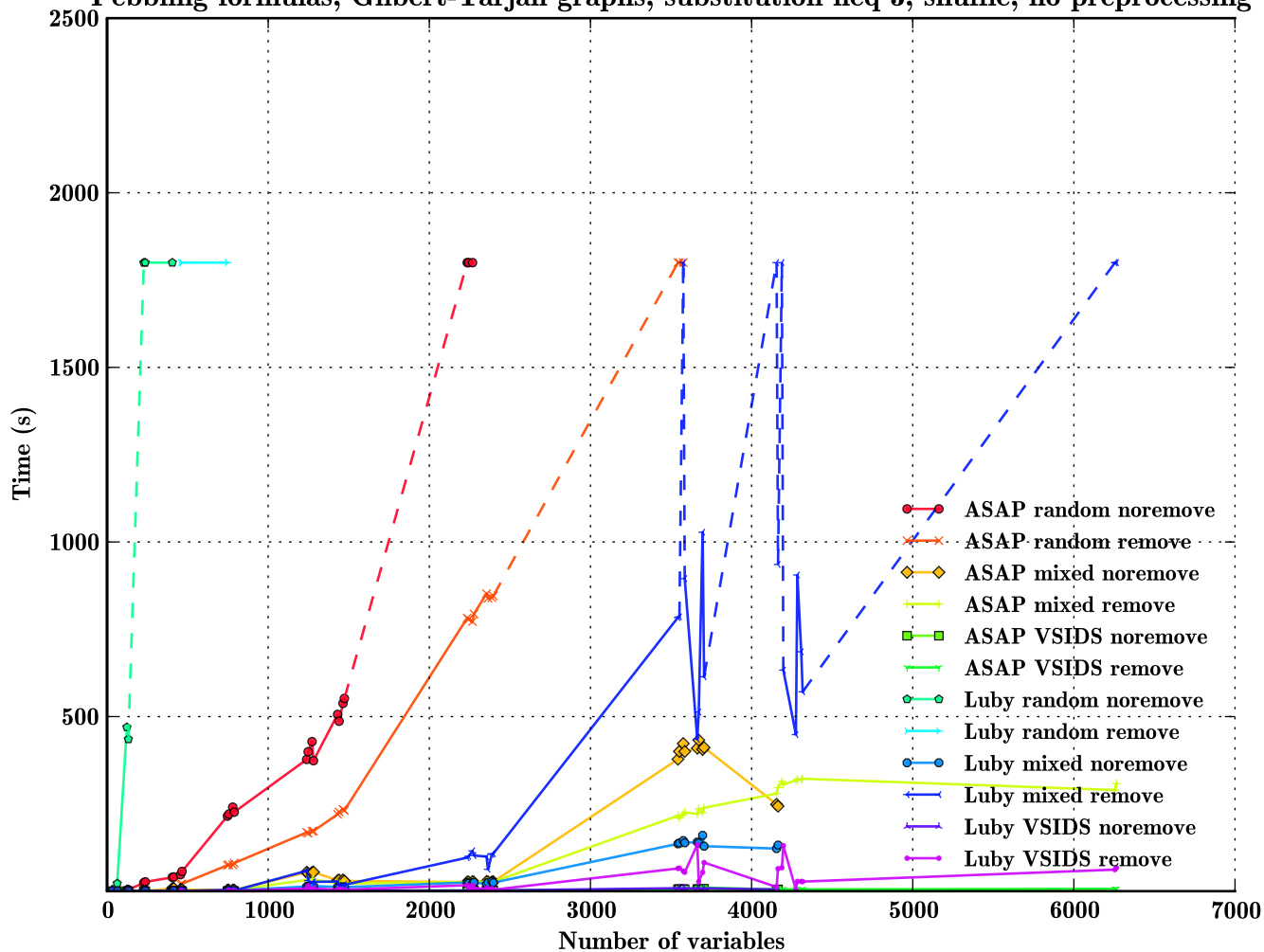


**Pebbling formulas with
substitution neq(not all equal)
of arity 3**

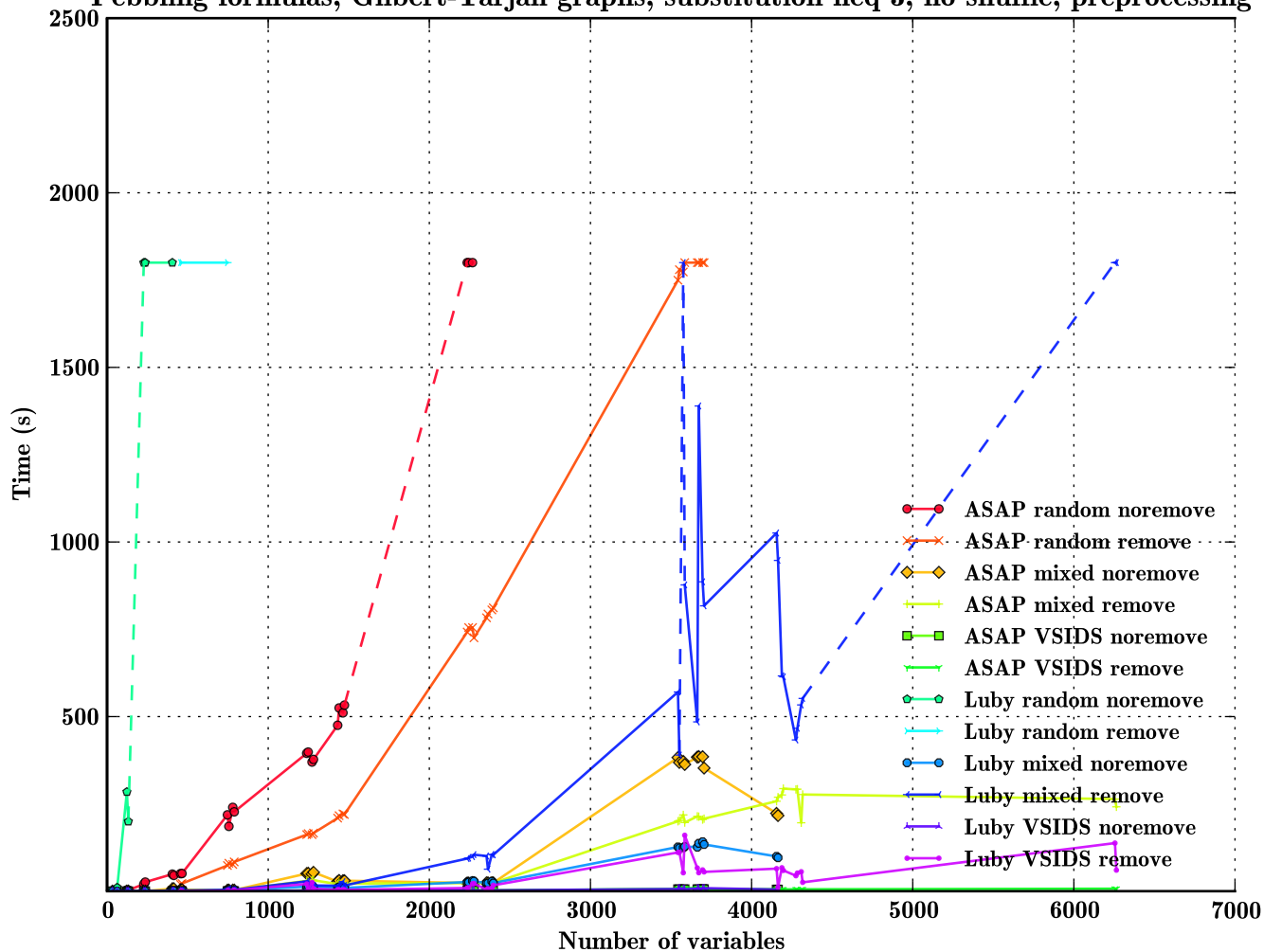
Pebbling formulas, Gilbert-Tarjan graphs, substitution neq 3, no shuffle, no preprocessing



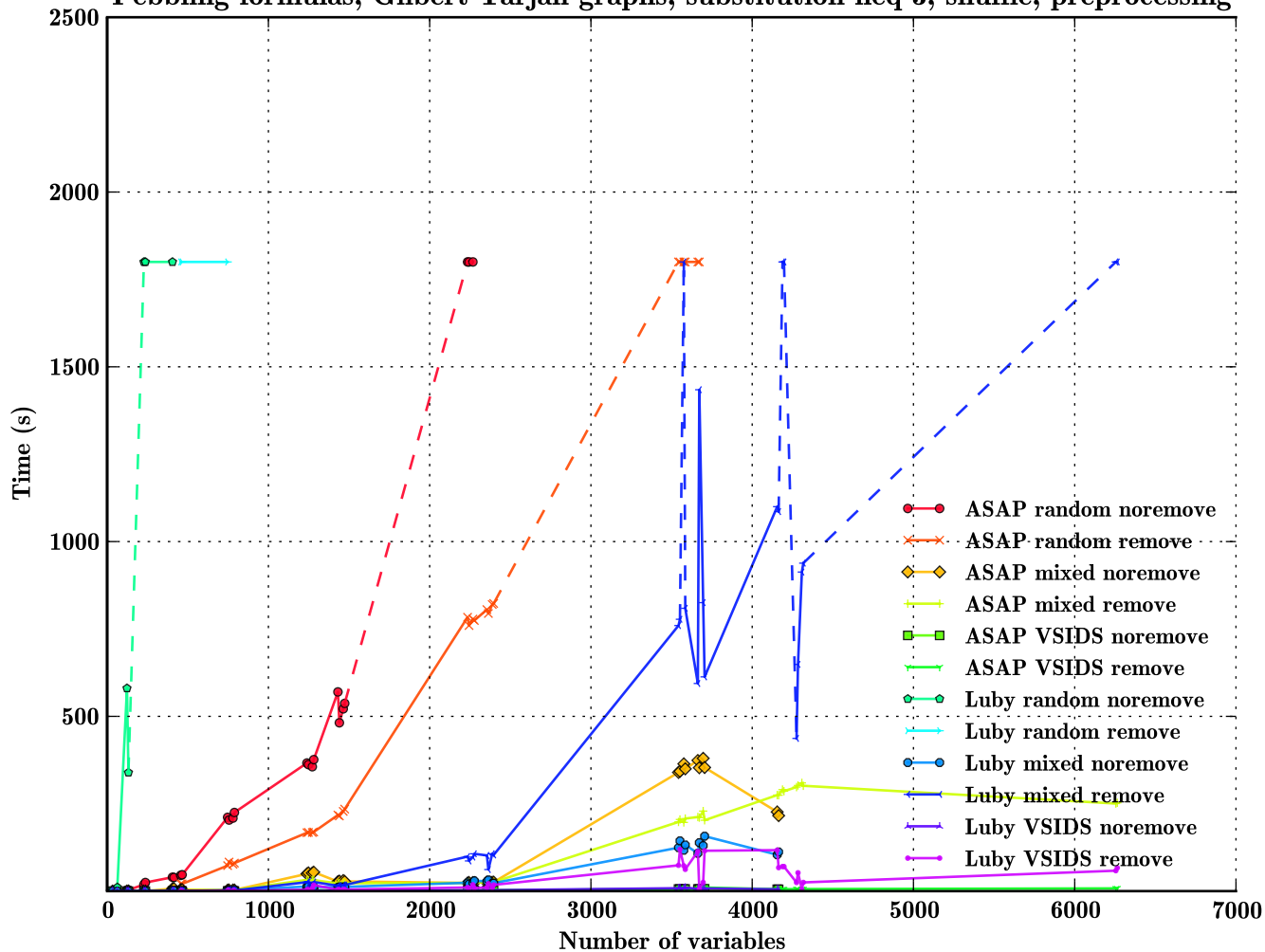
Pebbling formulas, Gilbert-Tarjan graphs, substitution neq 3, shuffle, no preprocessing



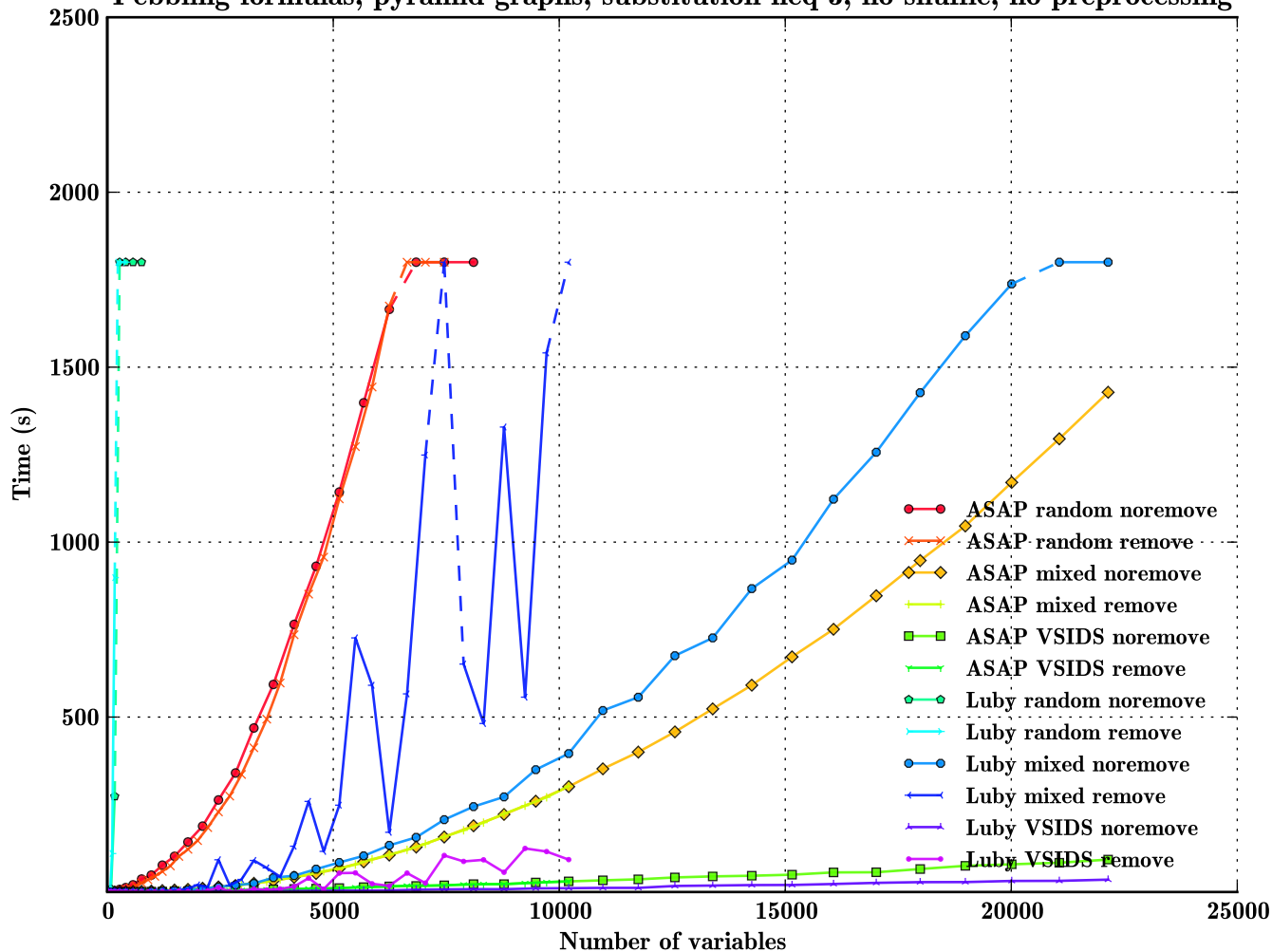
Pebbling formulas, Gilbert-Tarjan graphs, substitution neq 3, no shuffle, preprocessing



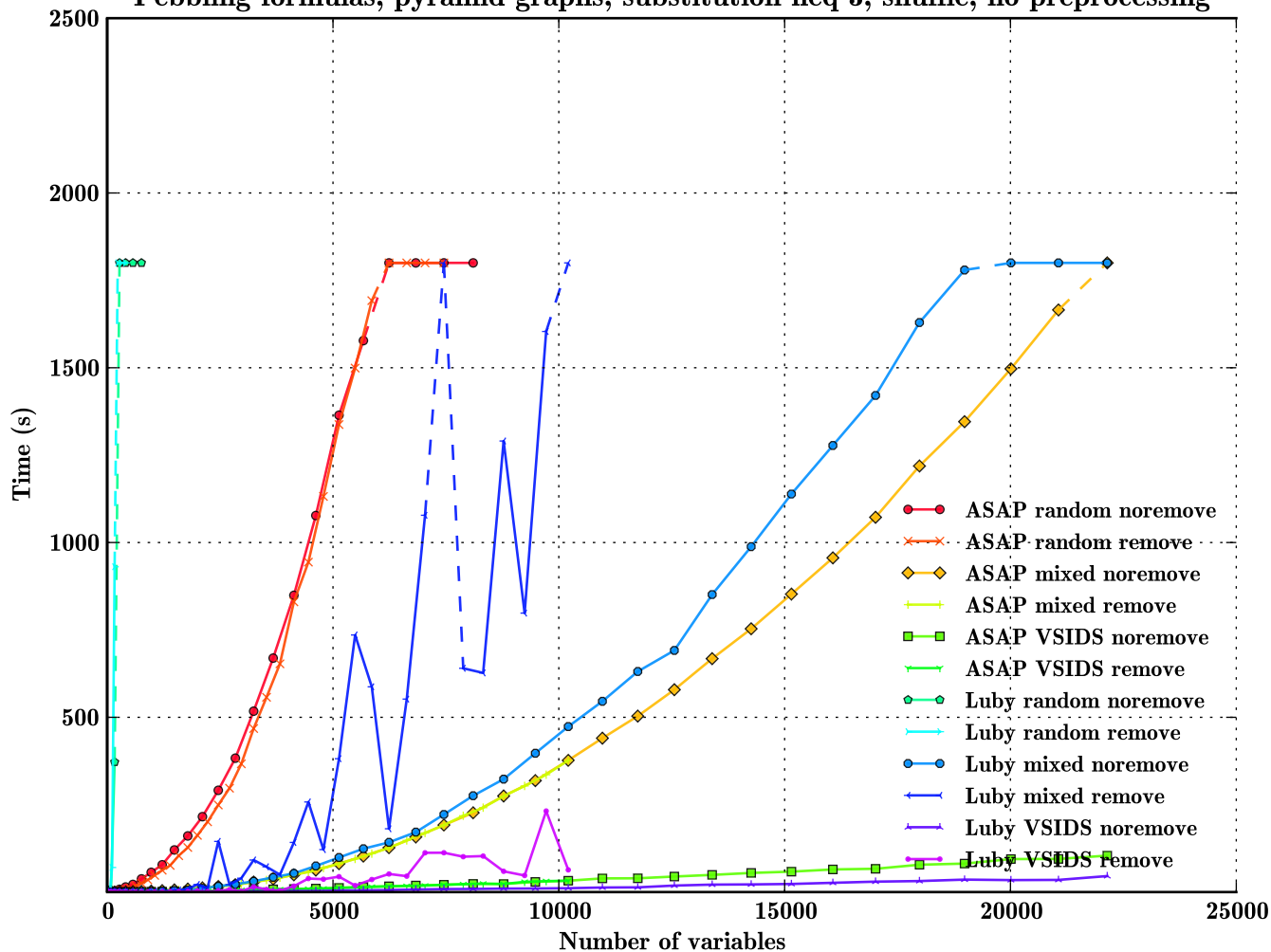
Pebbling formulas, Gilbert-Tarjan graphs, substitution neq 3, shuffle, preprocessing



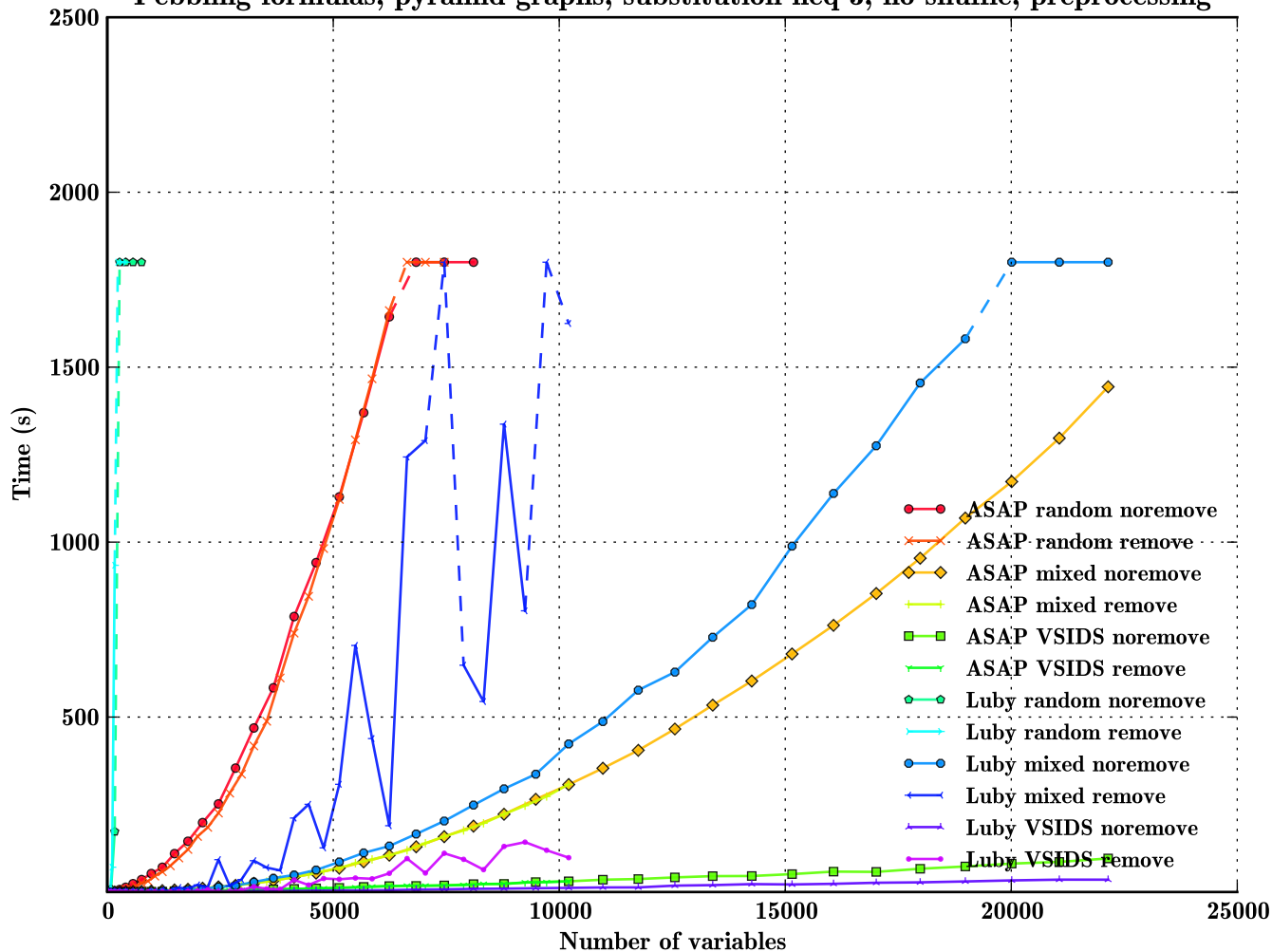
Pebbling formulas, pyramid graphs, substitution neq 3, no shuffle, no preprocessing



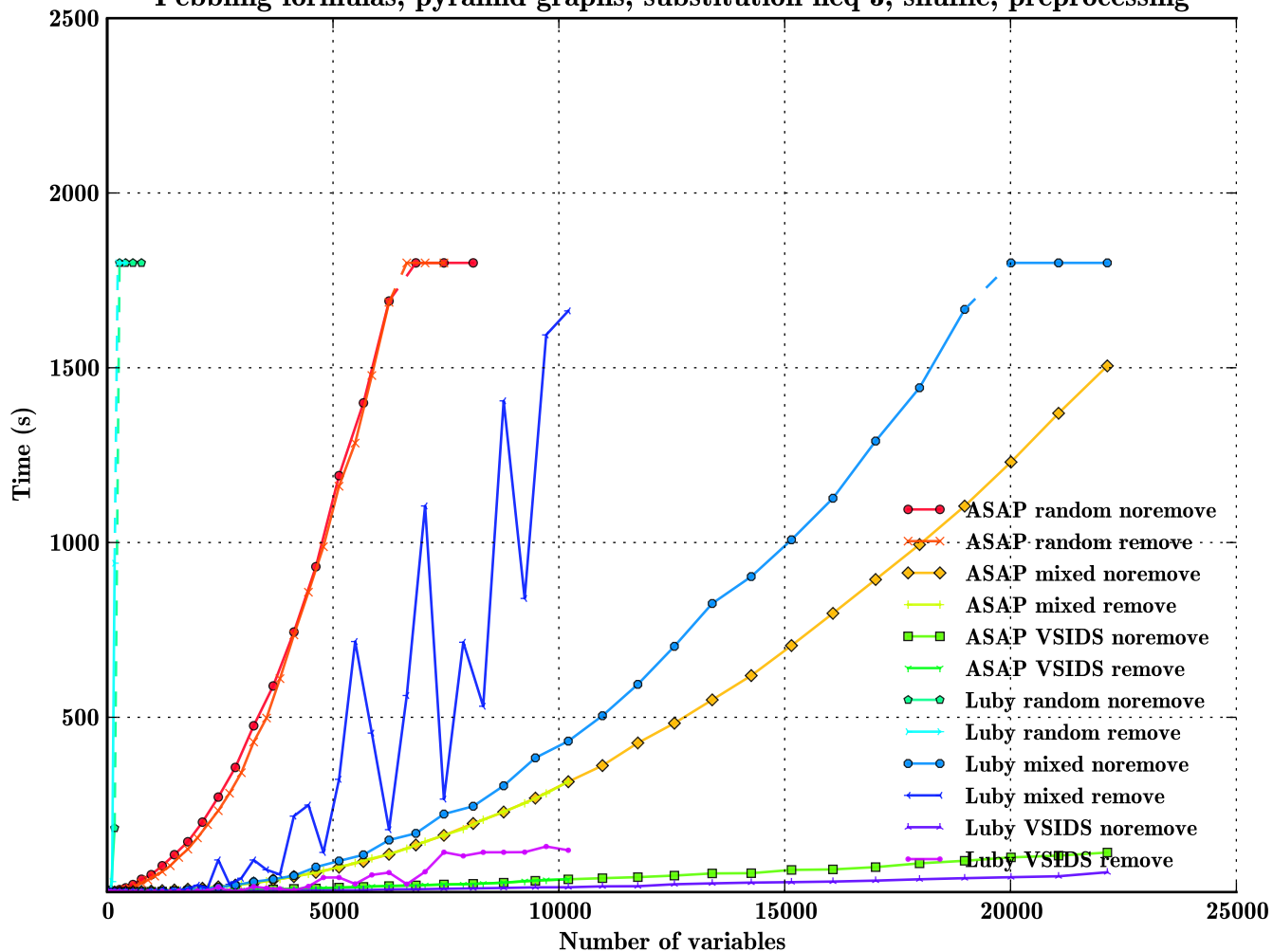
Pebbling formulas, pyramid graphs, substitution neq 3, shuffle, no preprocessing

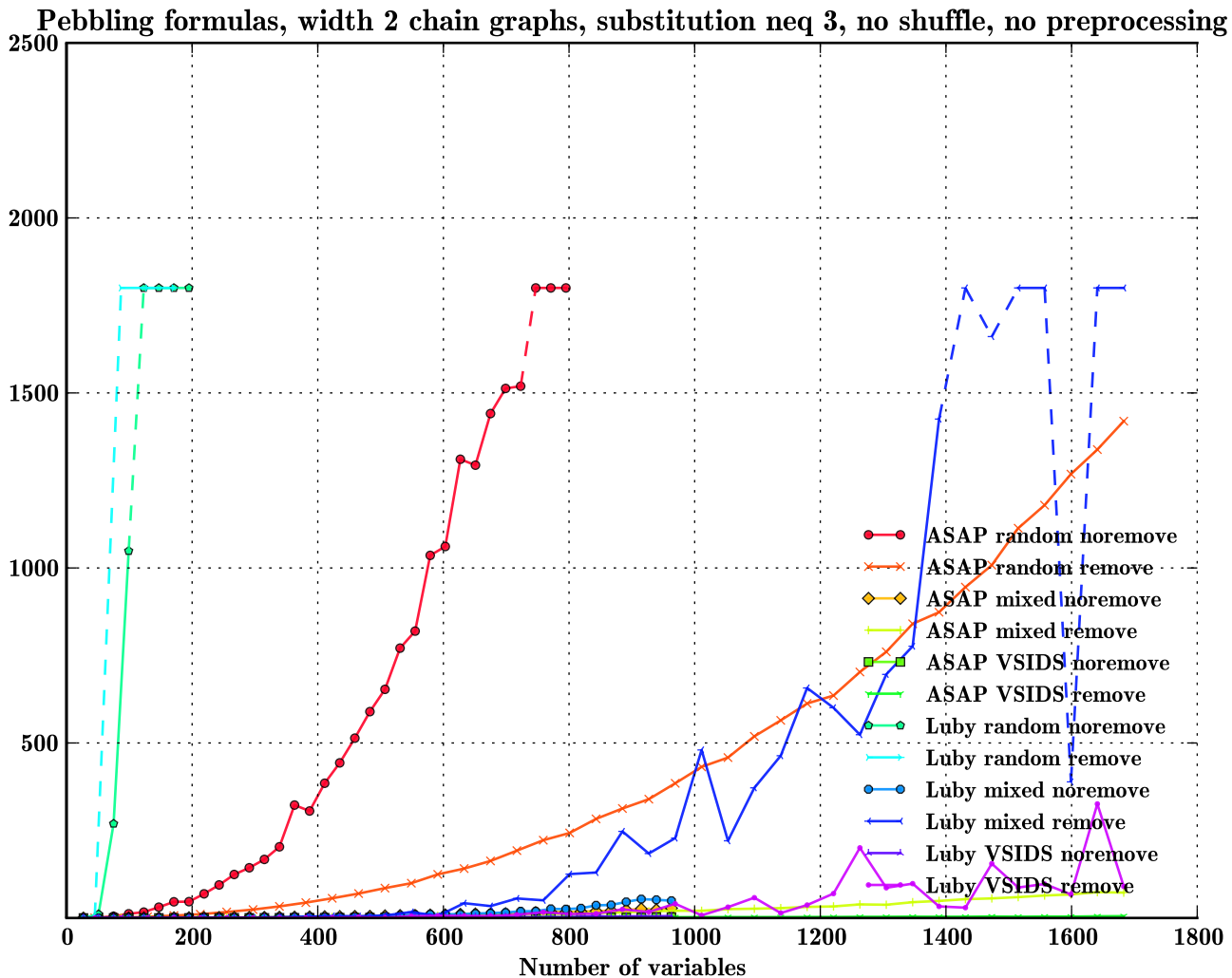


Pebbling formulas, pyramid graphs, substitution neq 3, no shuffle, preprocessing

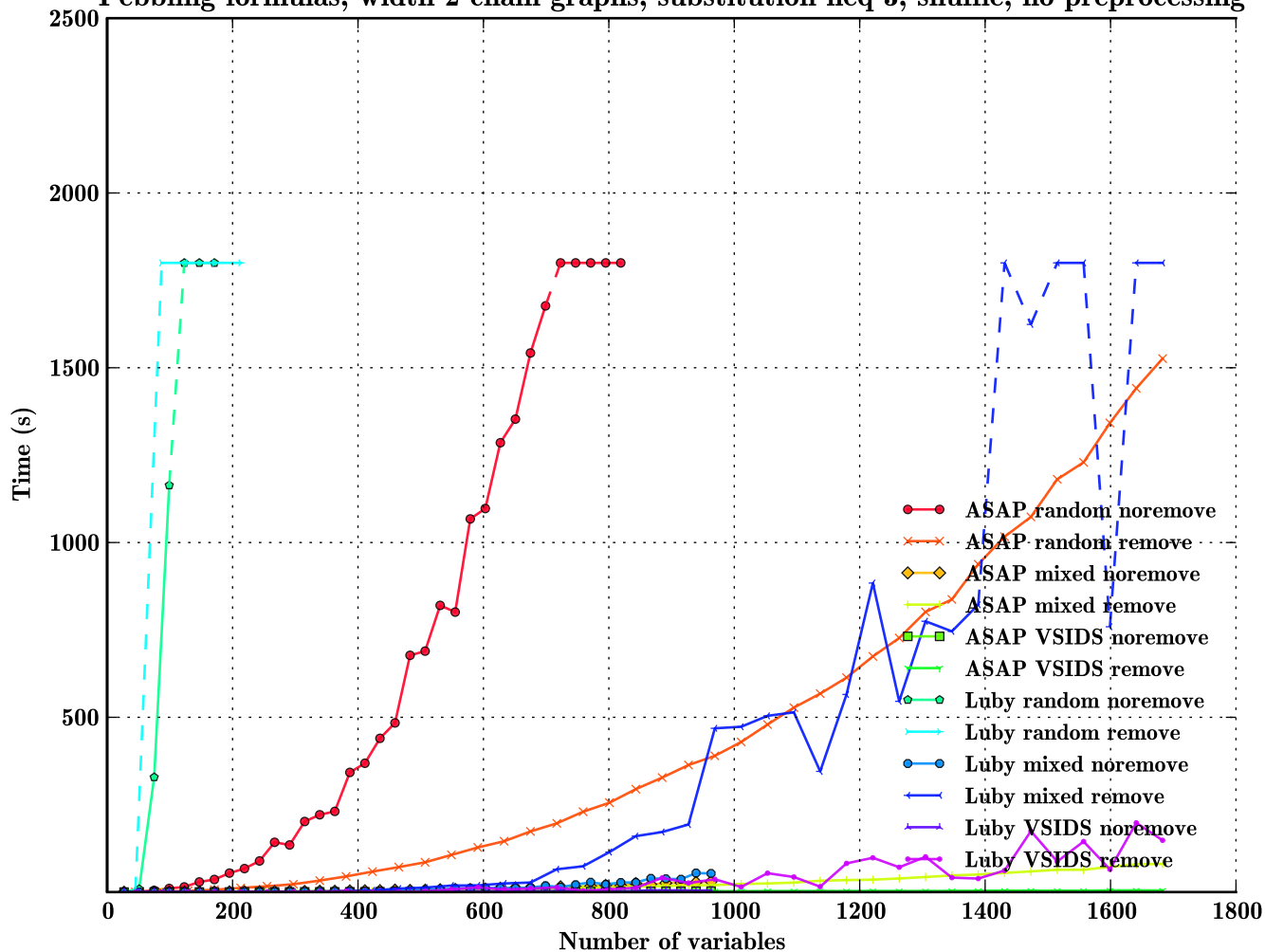


Pebbling formulas, pyramid graphs, substitution neq 3, shuffle, preprocessing

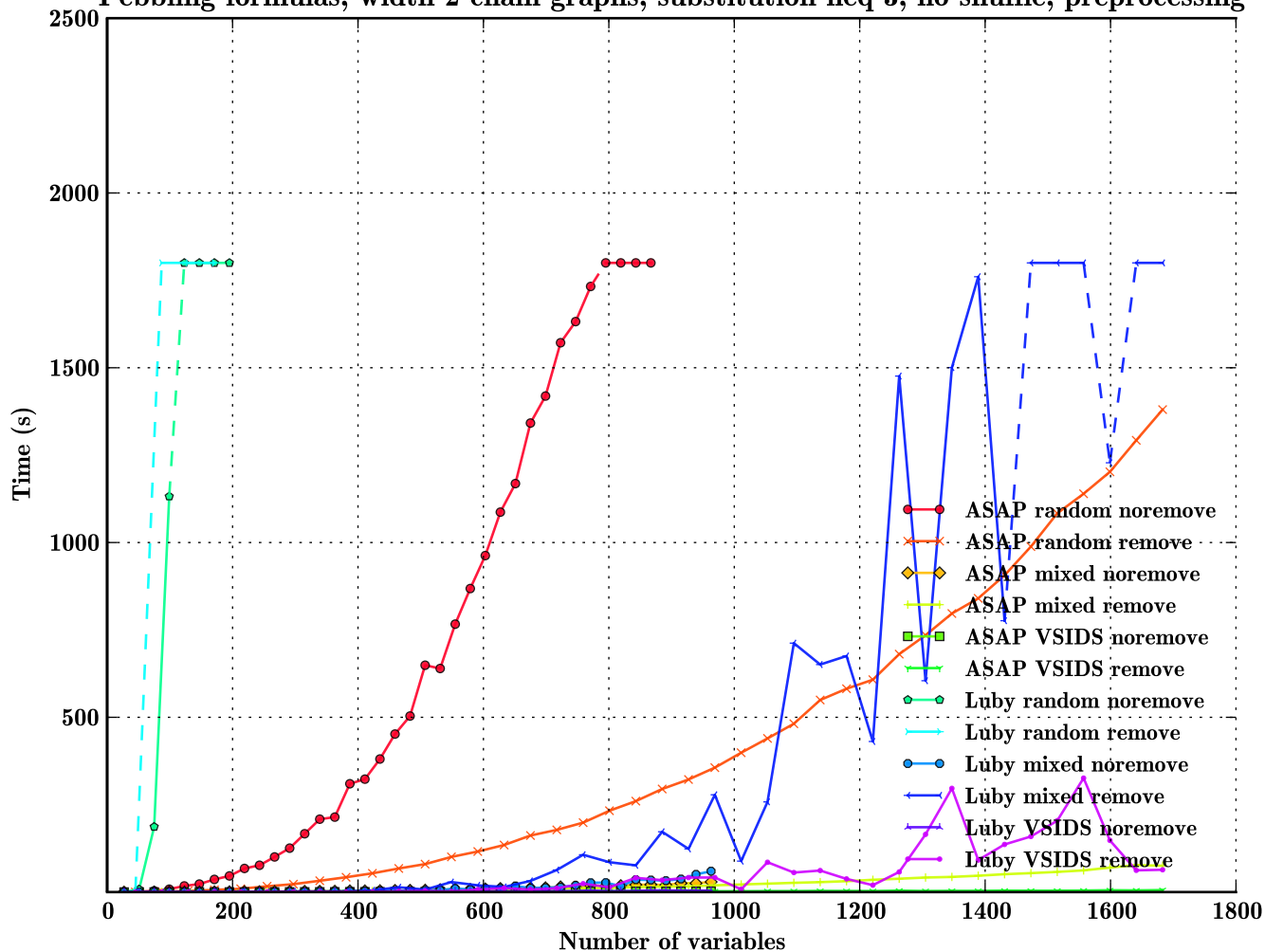




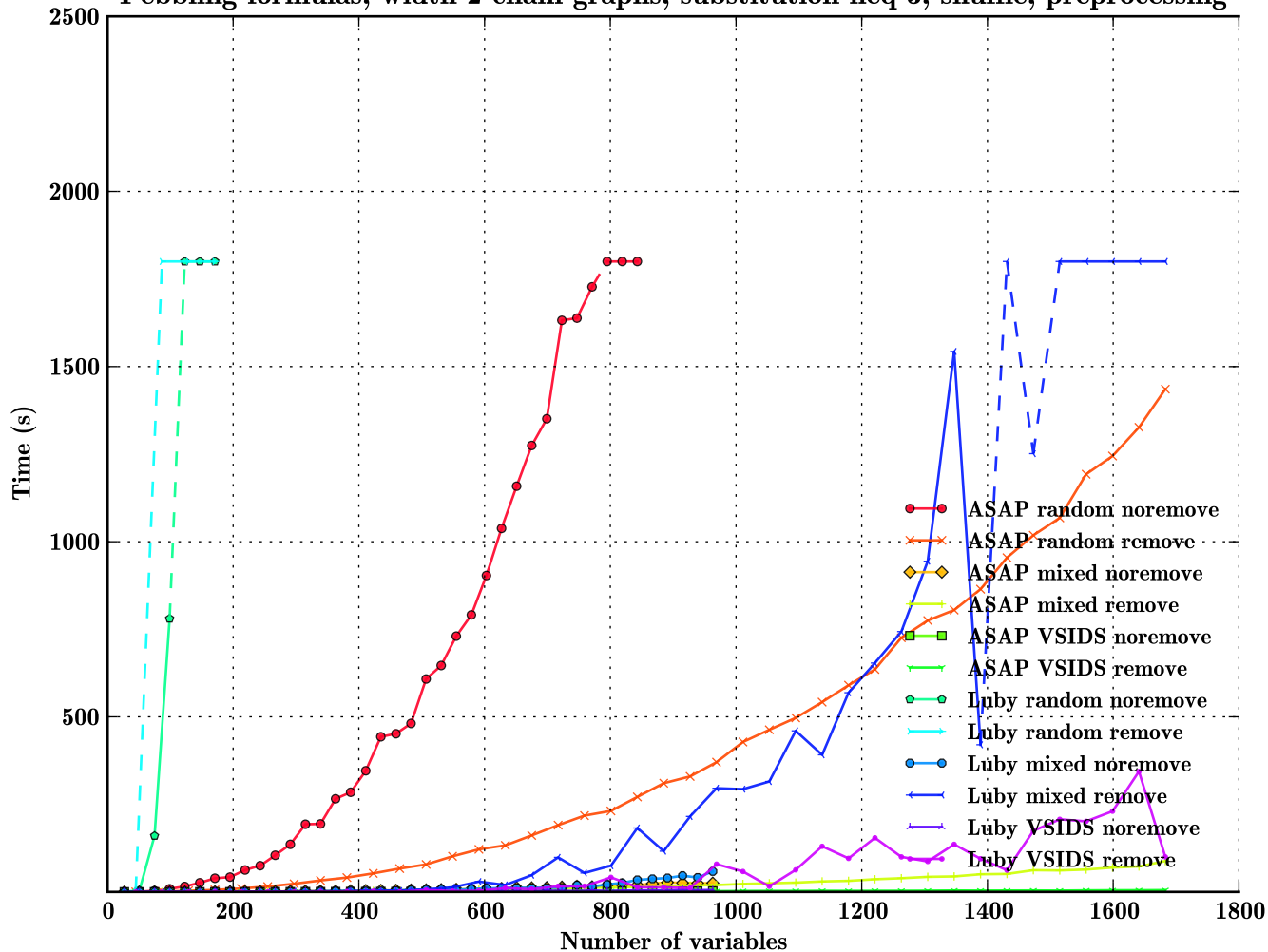
Pebbling formulas, width 2 chain graphs, substitution neq 3, shuffle, no preprocessing



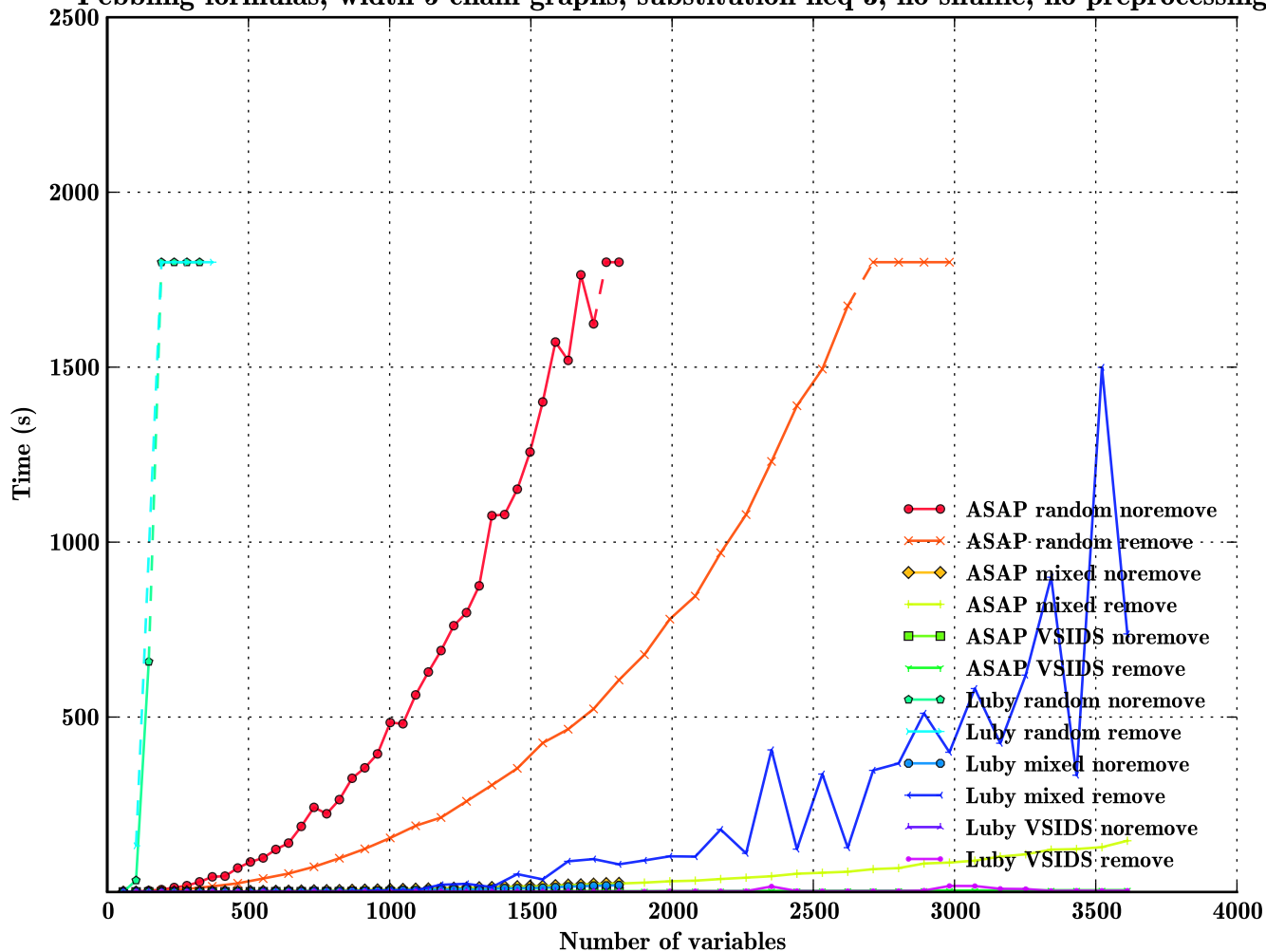
Pebbling formulas, width 2 chain graphs, substitution neq 3, no shuffle, preprocessing



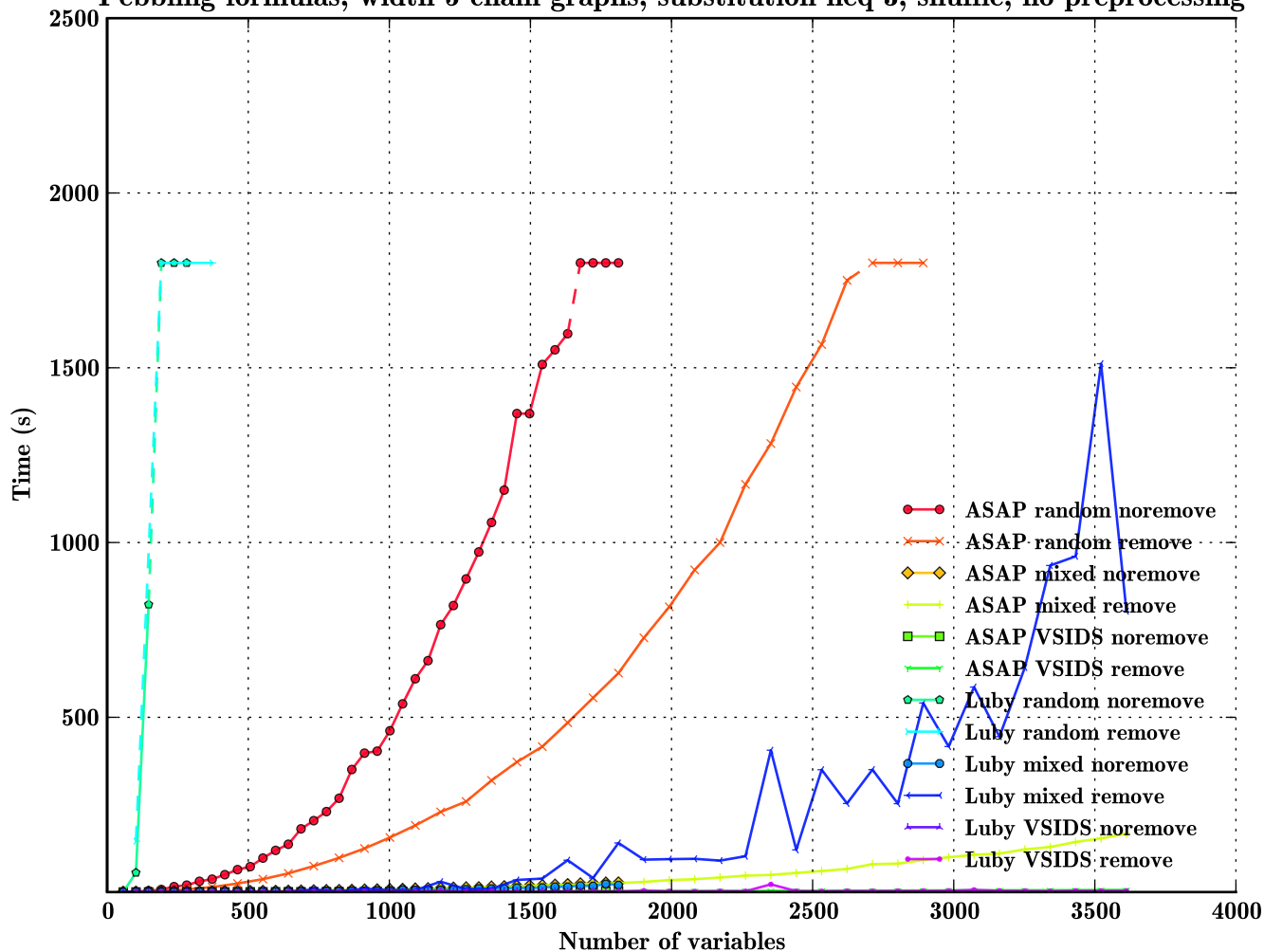
Pebbling formulas, width 2 chain graphs, substitution neq 3, shuffle, preprocessing



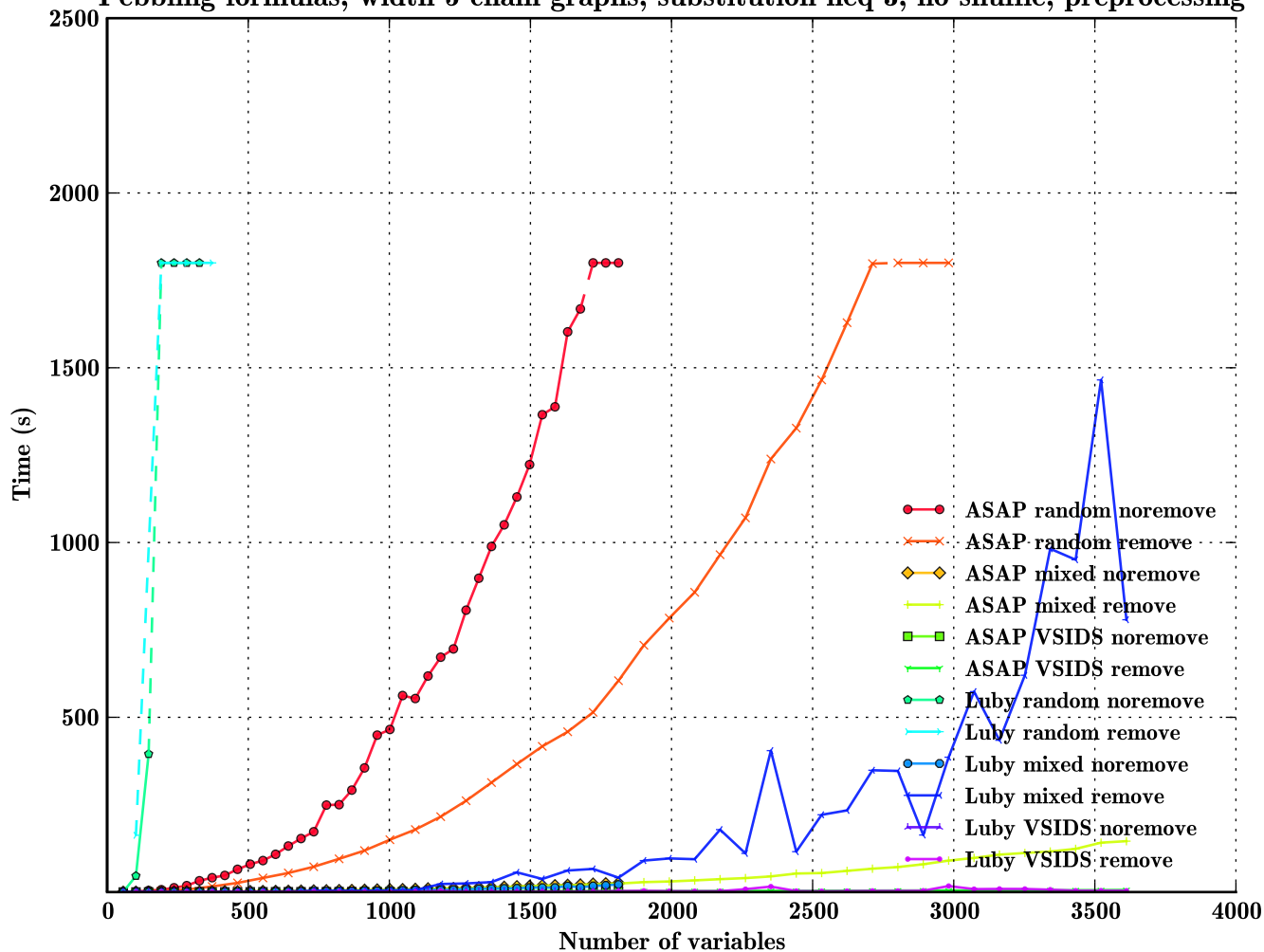
Pebbling formulas, width 5 chain graphs, substitution neq 3, no shuffle, no preprocessing



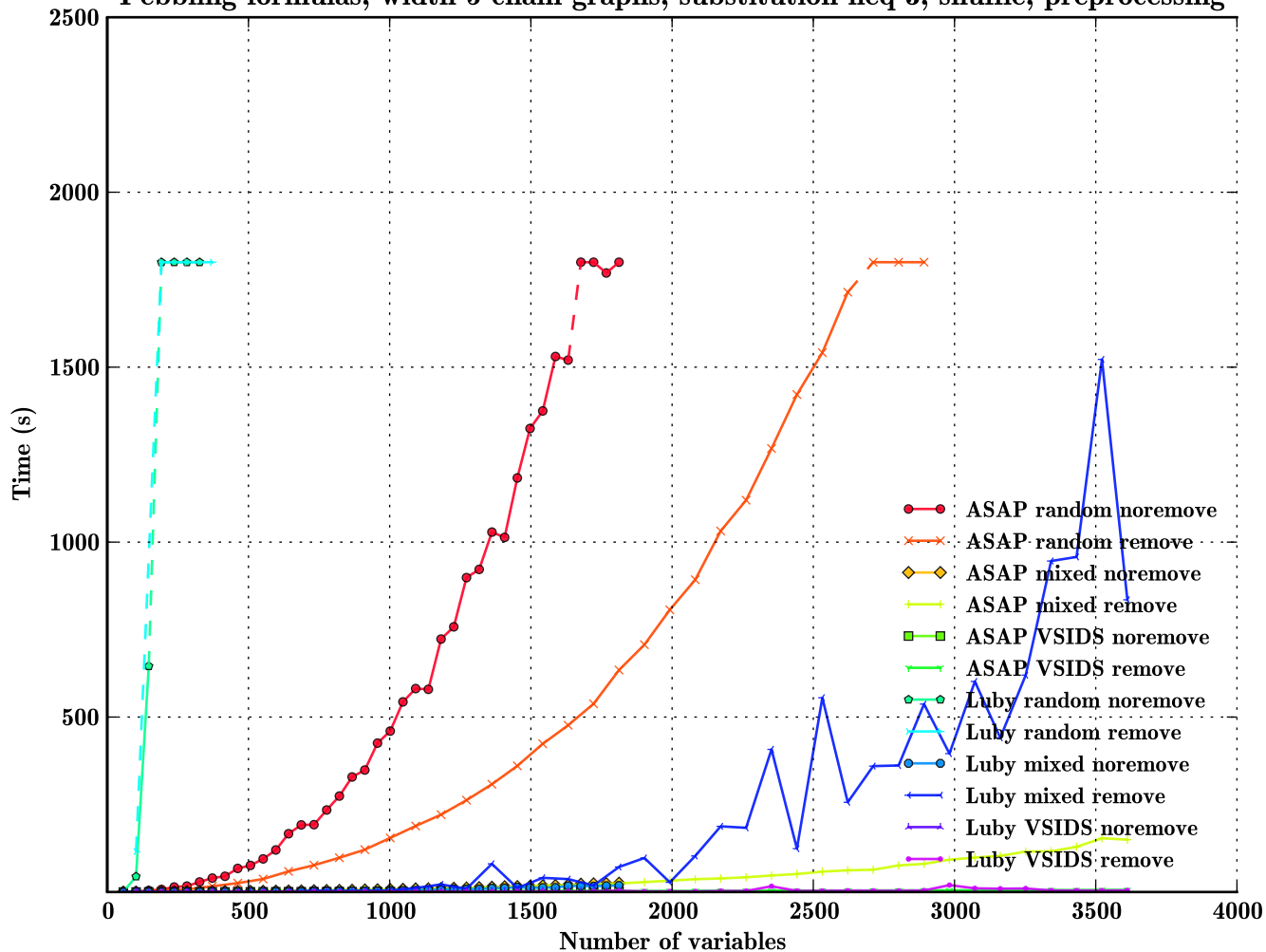
Pebbling formulas, width 5 chain graphs, substitution neq 3, shuffle, no preprocessing



Pebbling formulas, width 5 chain graphs, substitution neq 3, no shuffle, preprocessing

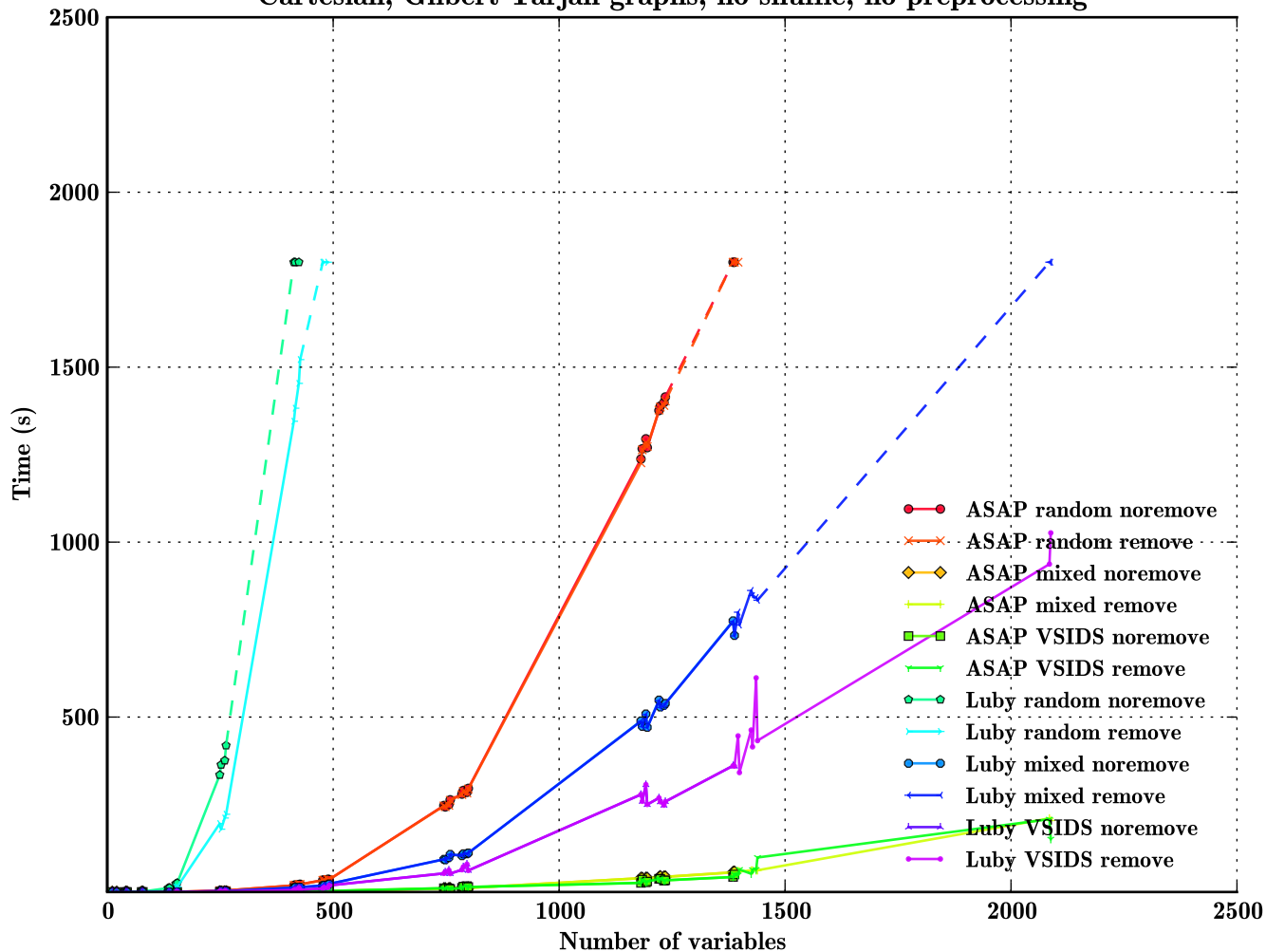


Pebbling formulas, width 5 chain graphs, substitution neq 3, shuffle, preprocessing

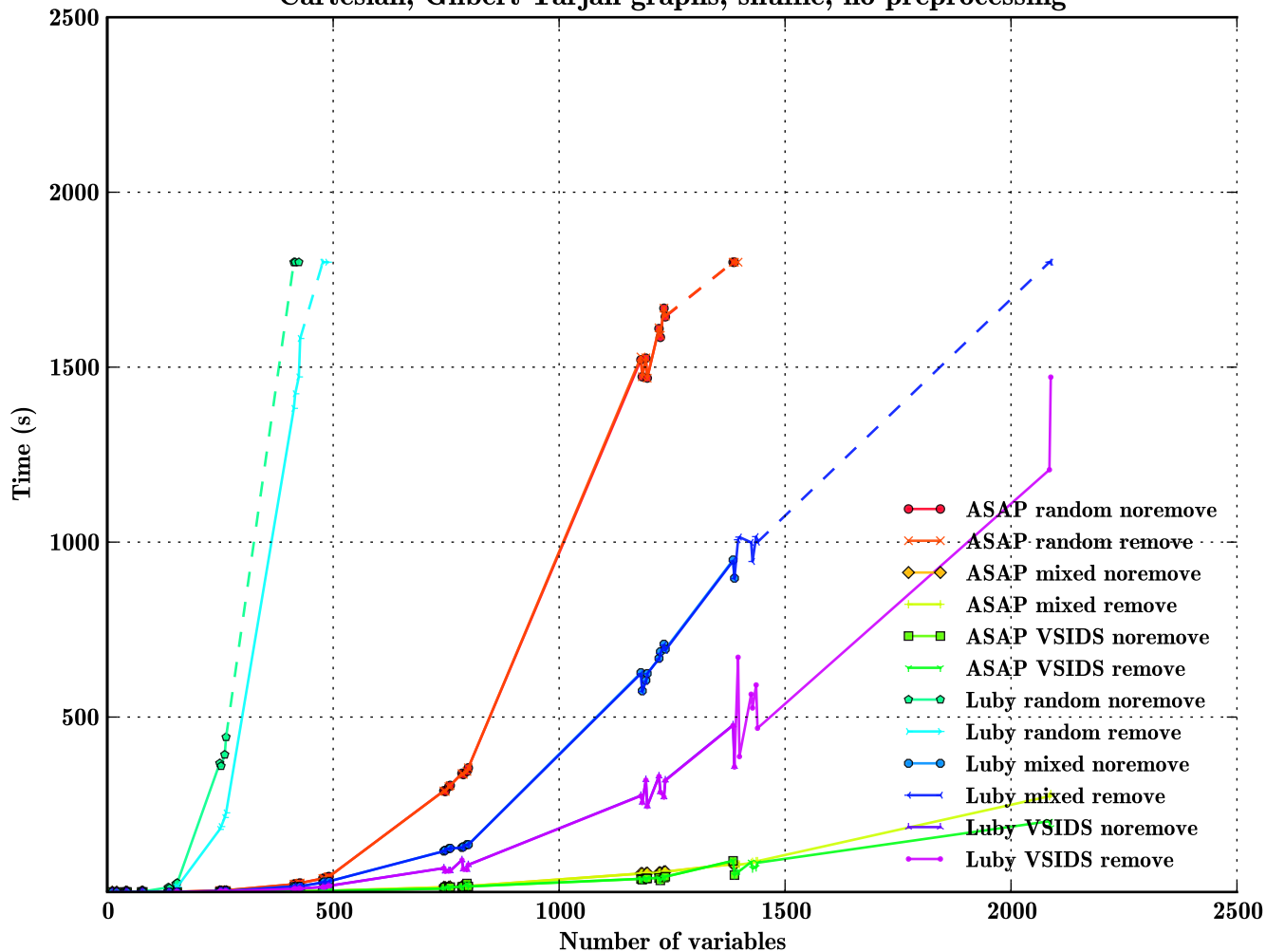


Cartesian products of vanilla pebbling formulas

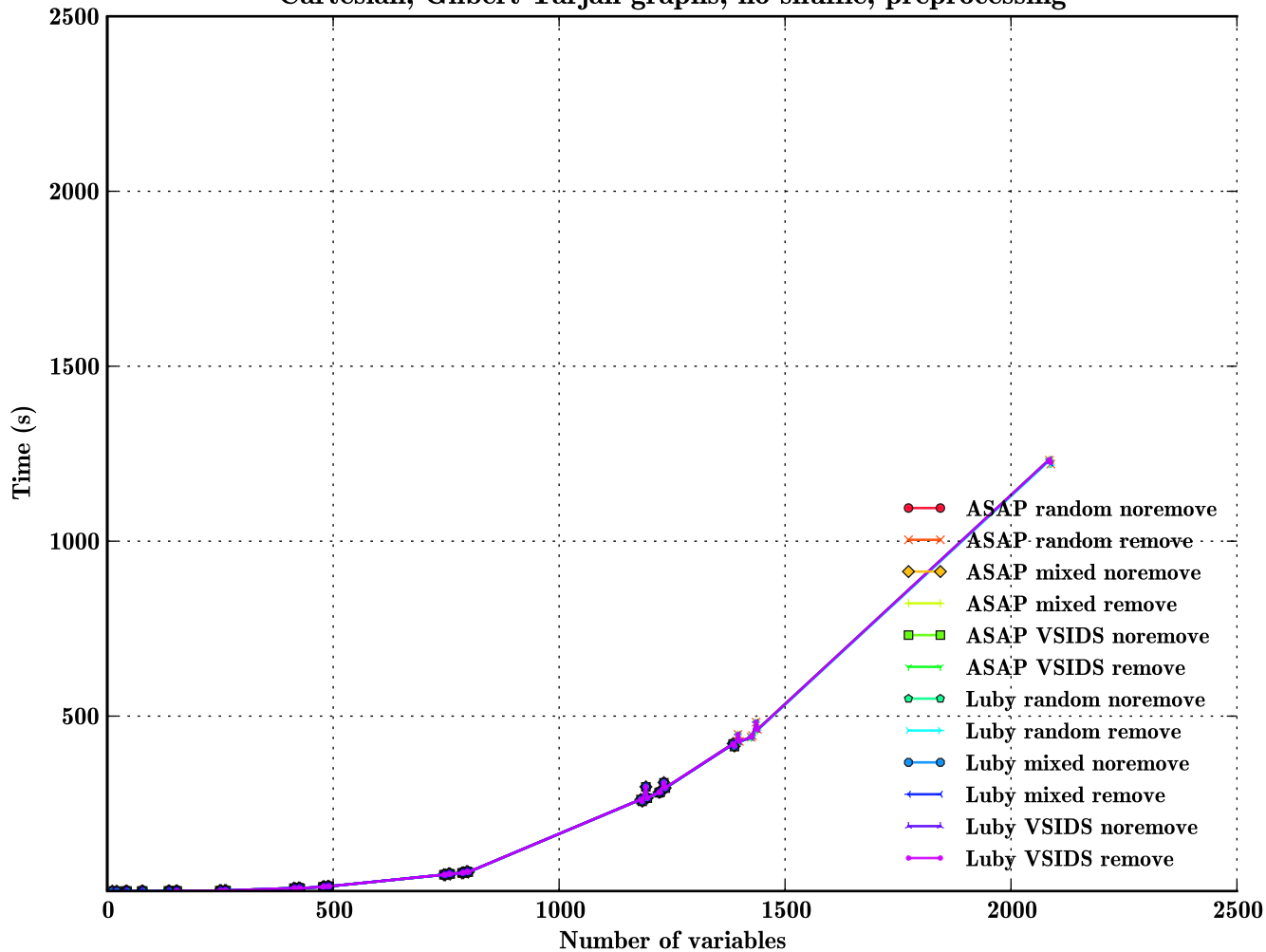
Cartesian, Gilbert-Tarjan graphs, no shuffle, no preprocessing



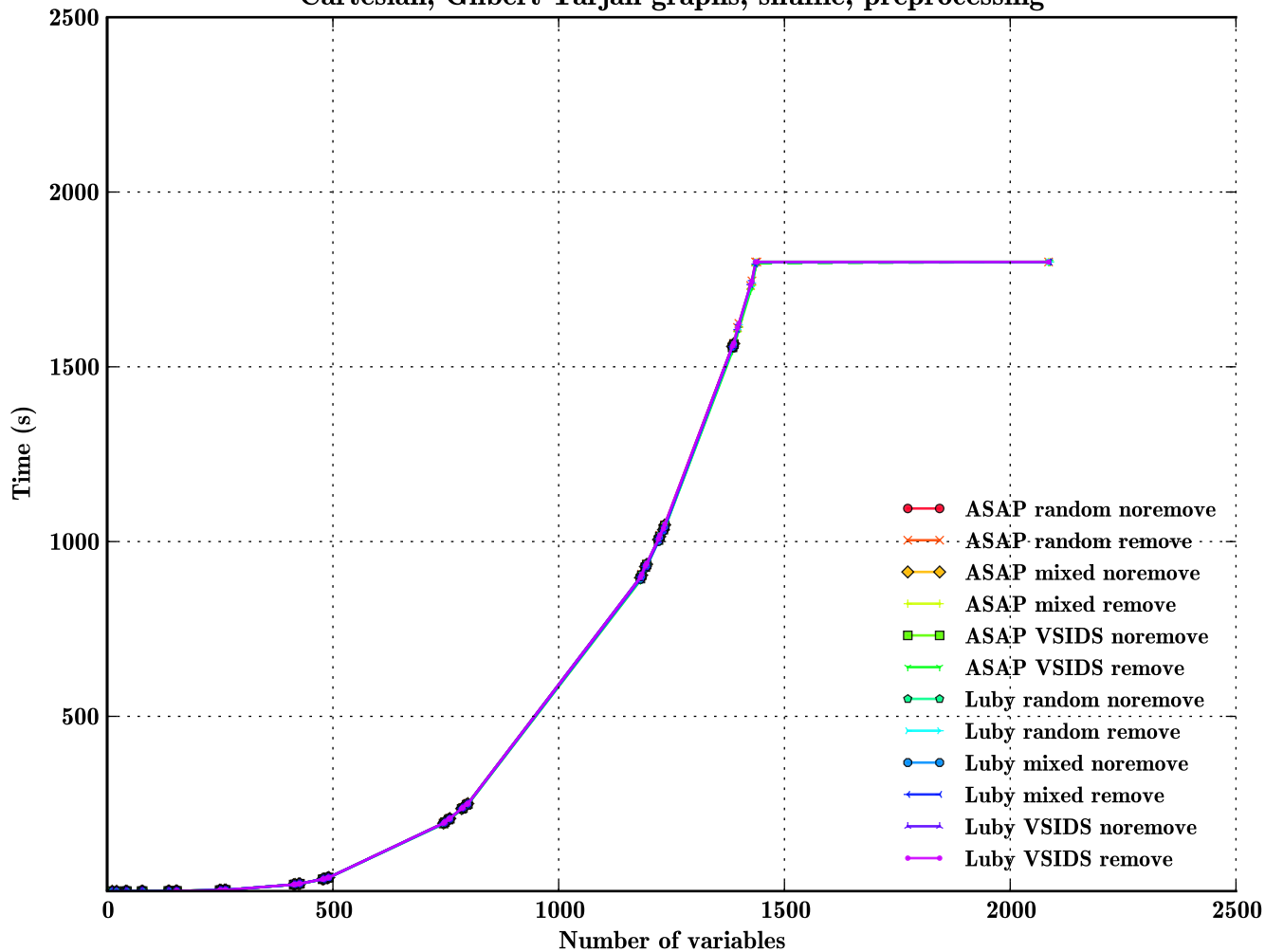
Cartesian, Gilbert-Tarjan graphs, shuffle, no preprocessing



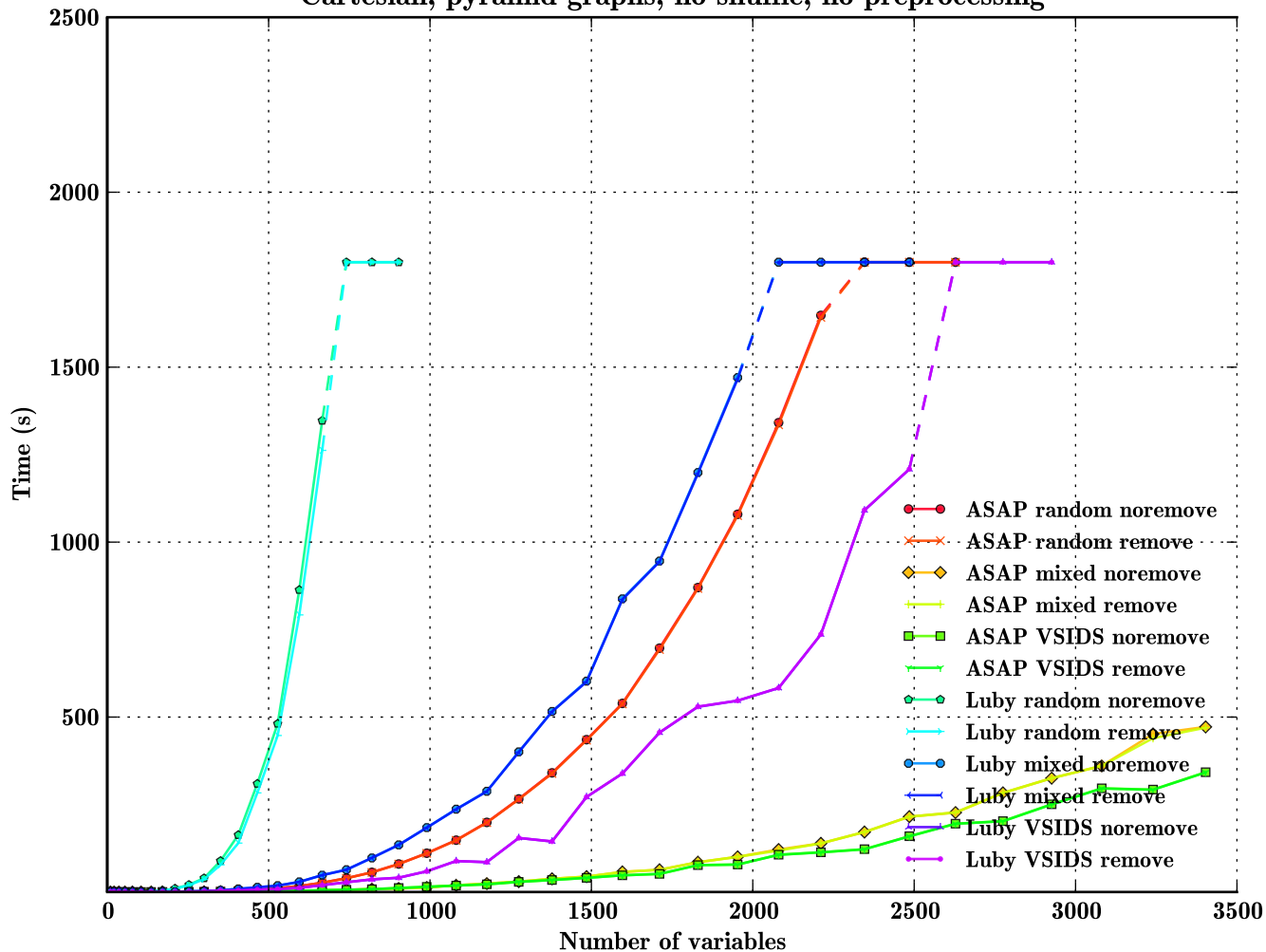
Cartesian, Gilbert-Tarjan graphs, no shuffle, preprocessing



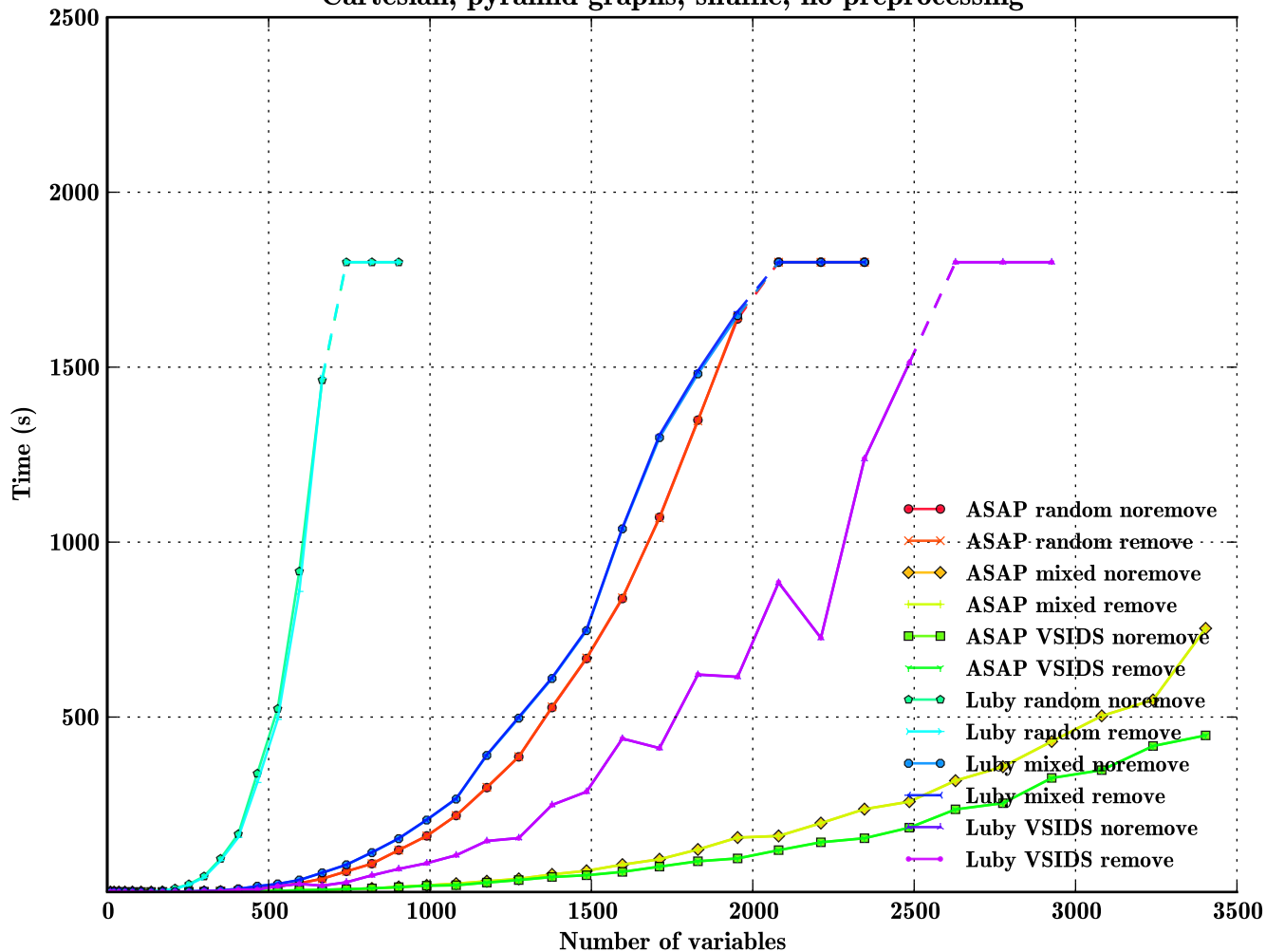
Cartesian, Gilbert-Tarjan graphs, shuffle, preprocessing



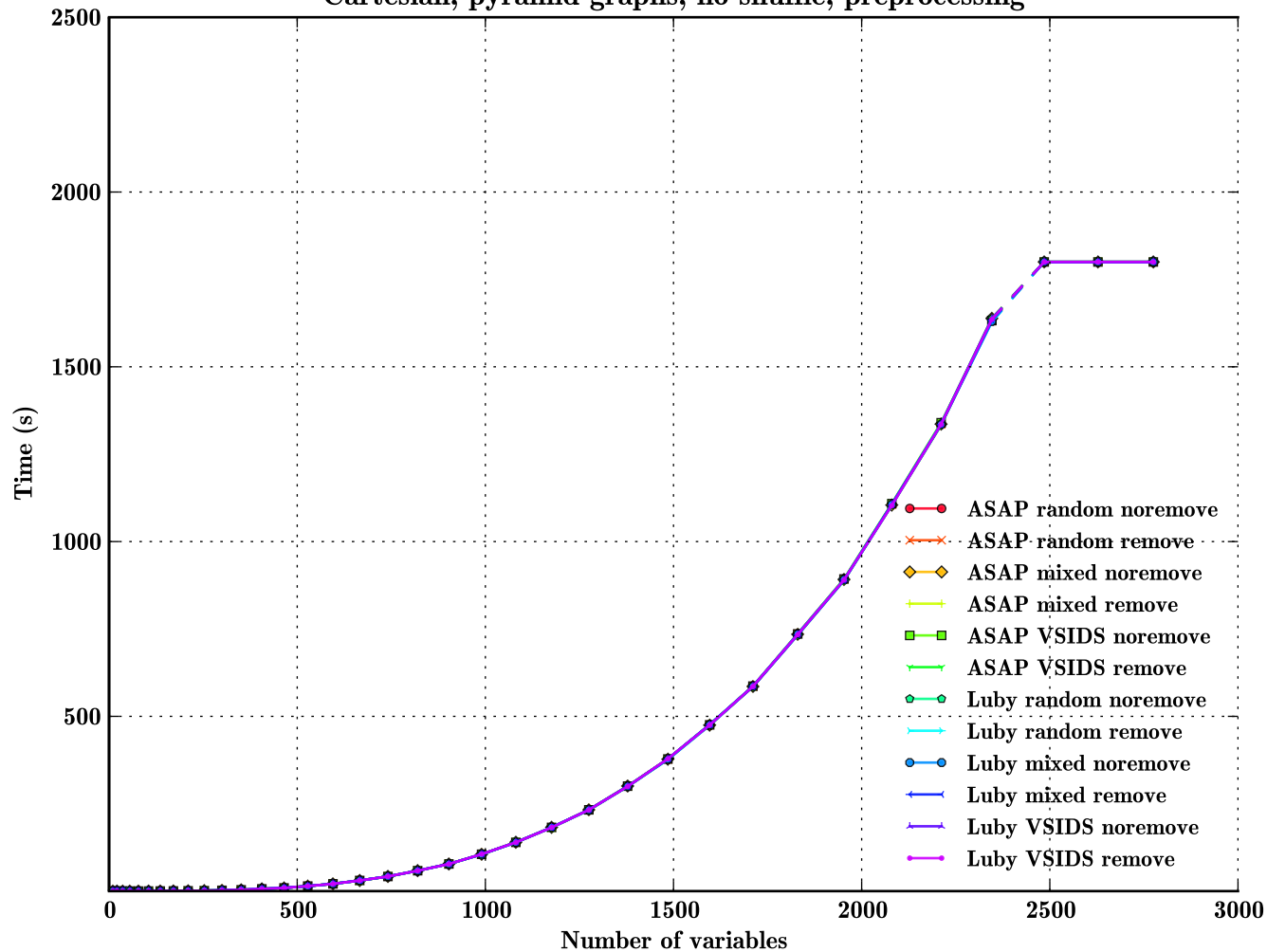
Cartesian, pyramid graphs, no shuffle, no preprocessing



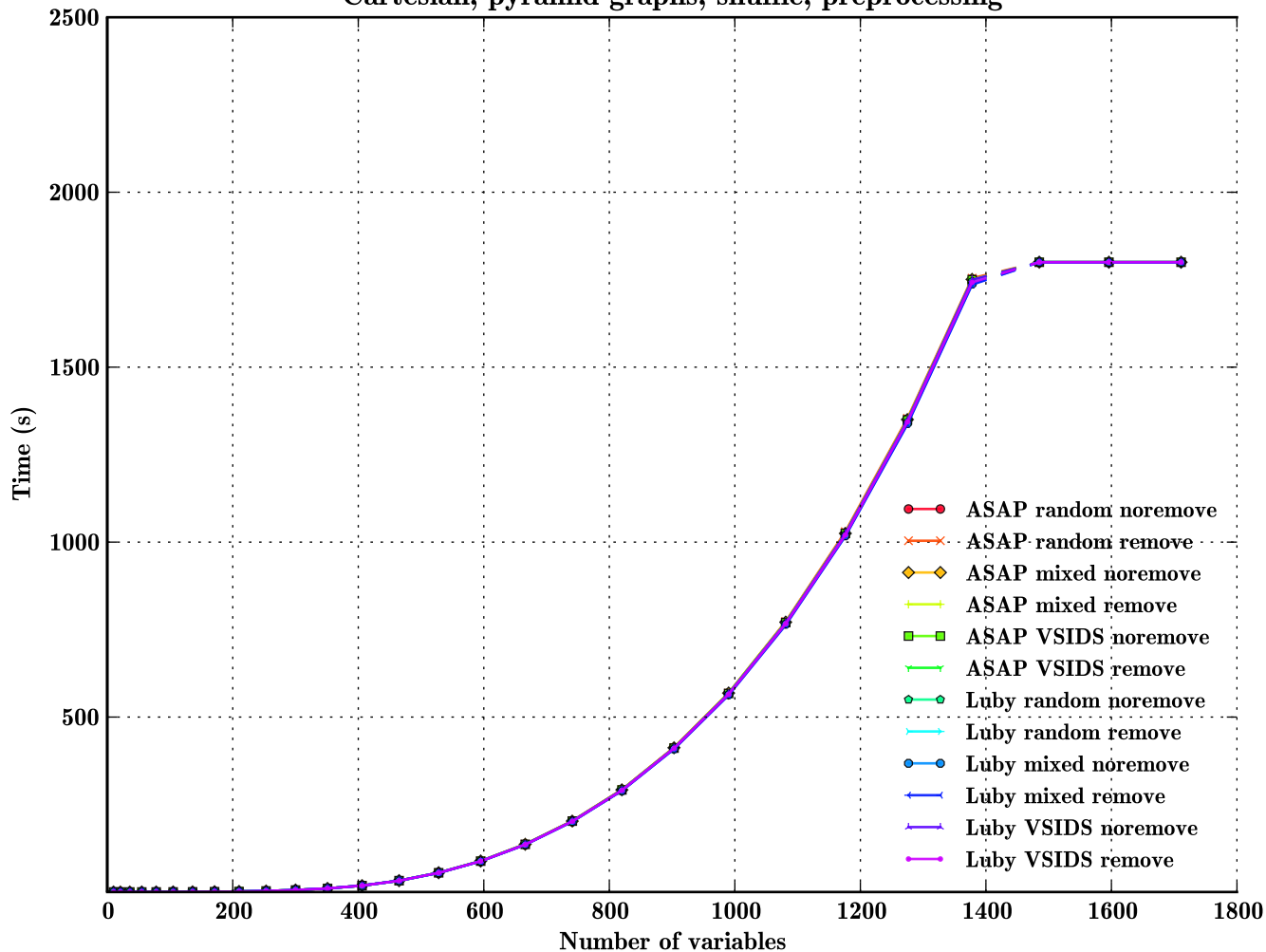
Cartesian, pyramid graphs, shuffle, no preprocessing



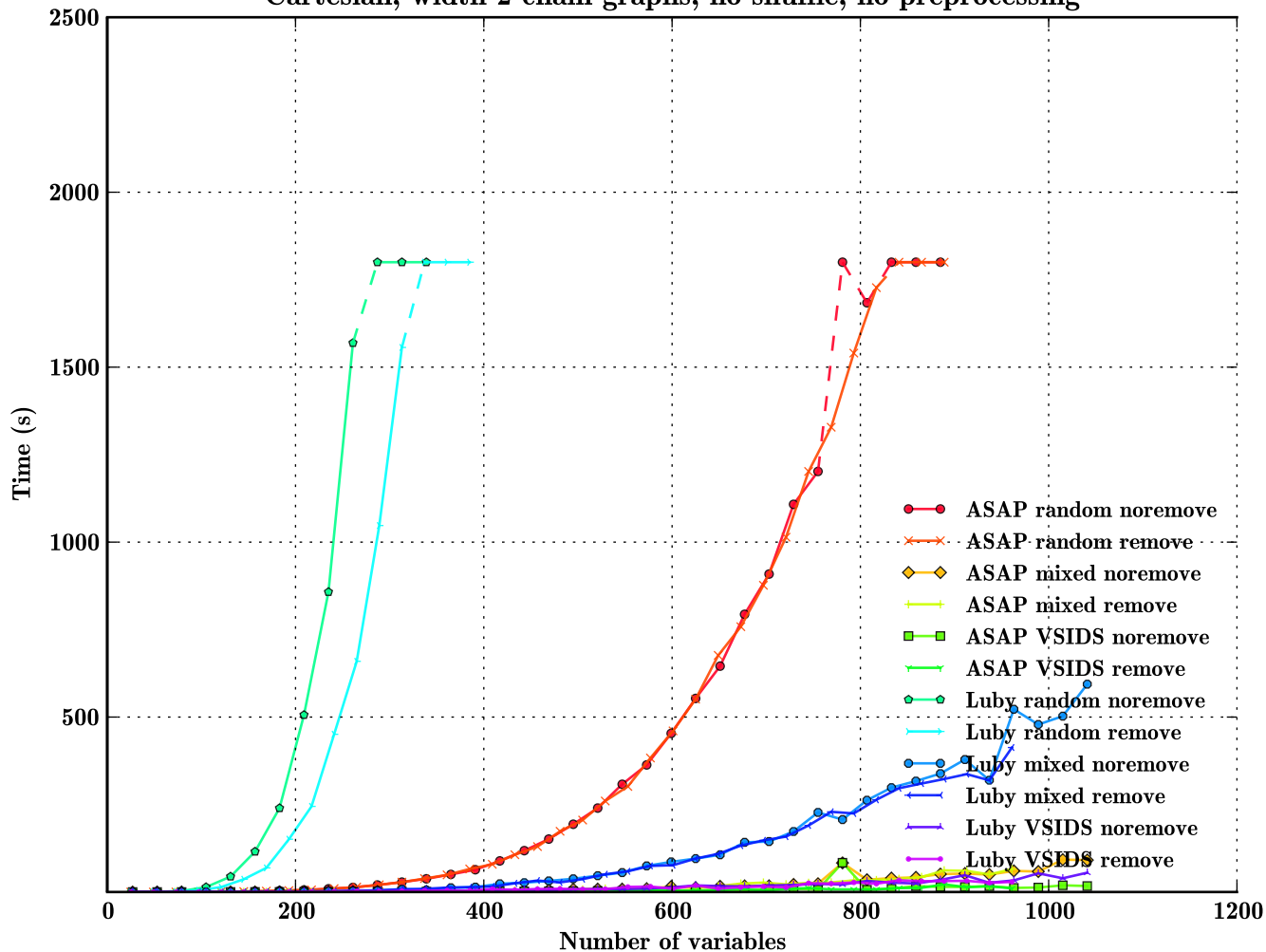
Cartesian, pyramid graphs, no shuffle, preprocessing



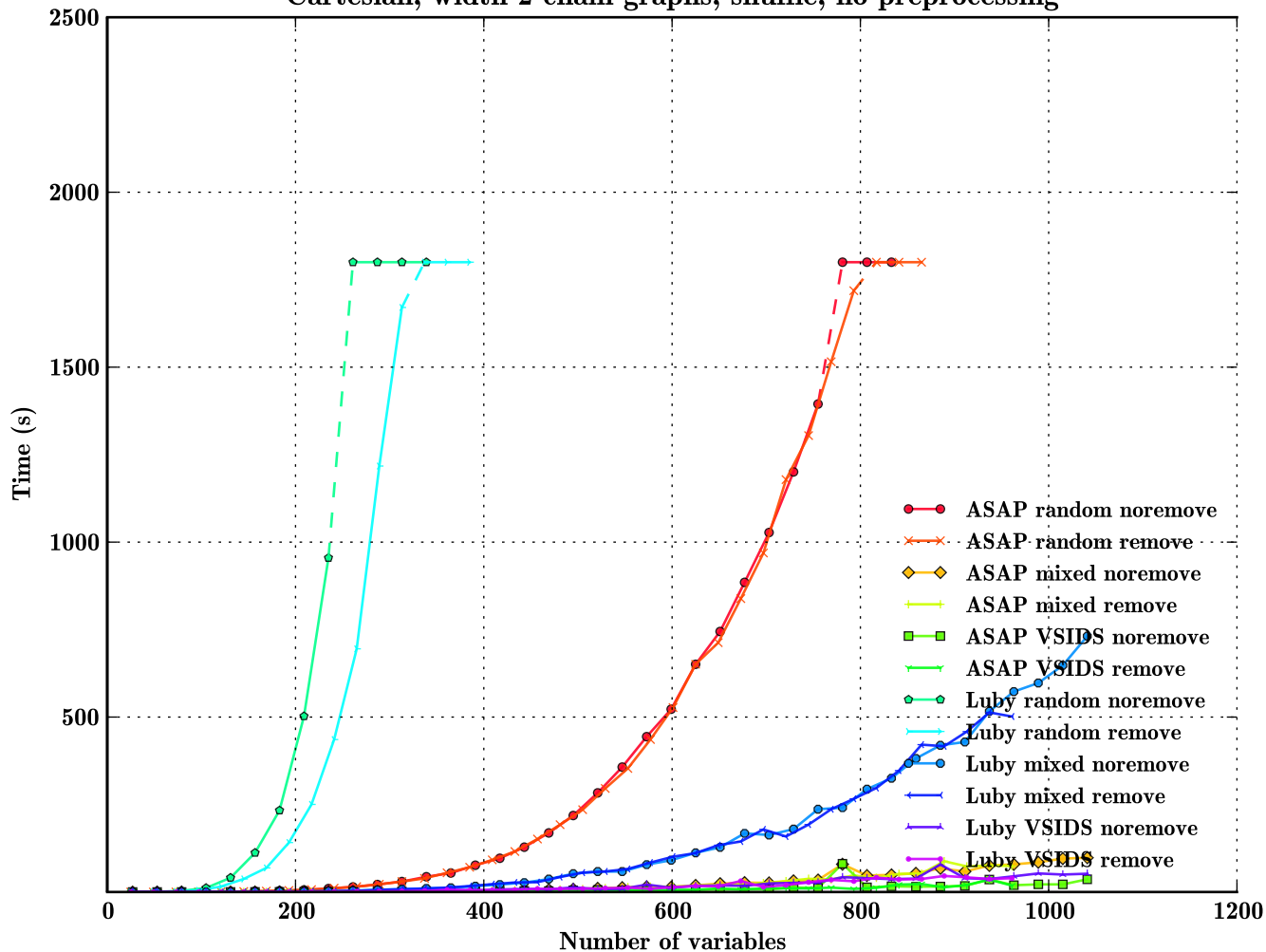
Cartesian, pyramid graphs, shuffle, preprocessing

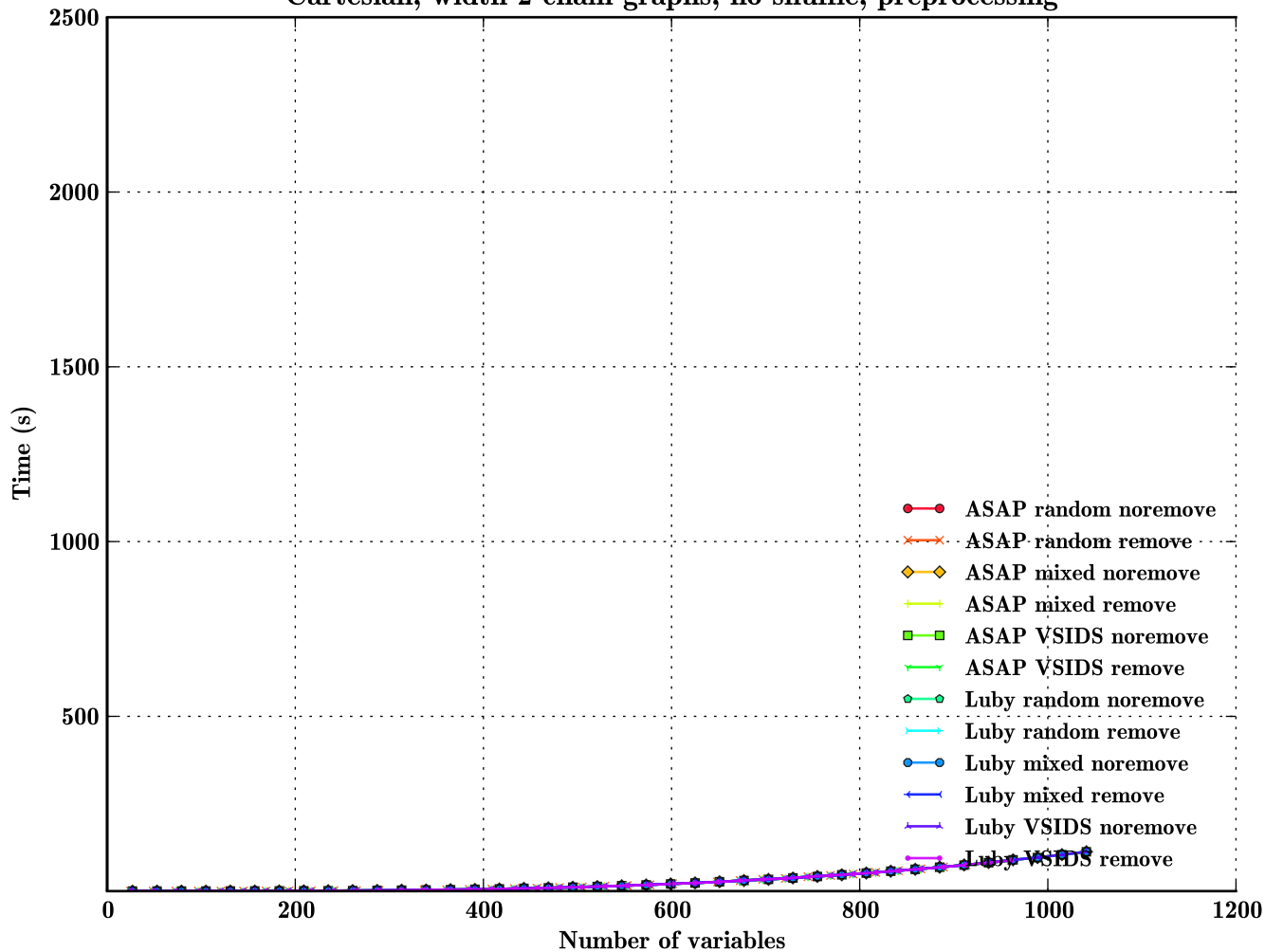


Cartesian, width 2 chain graphs, no shuffle, no preprocessing

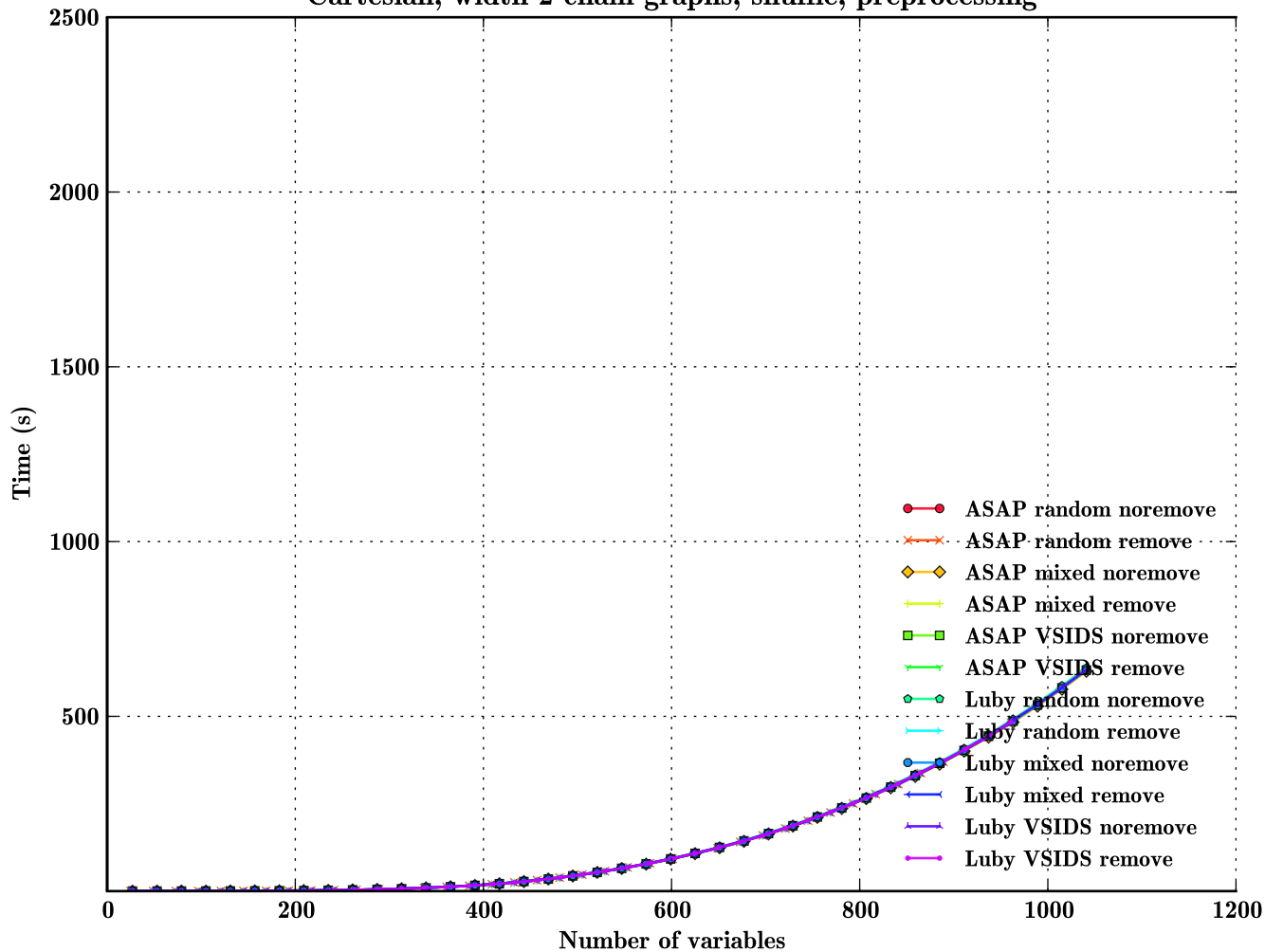


Cartesian, width 2 chain graphs, shuffle, no preprocessing

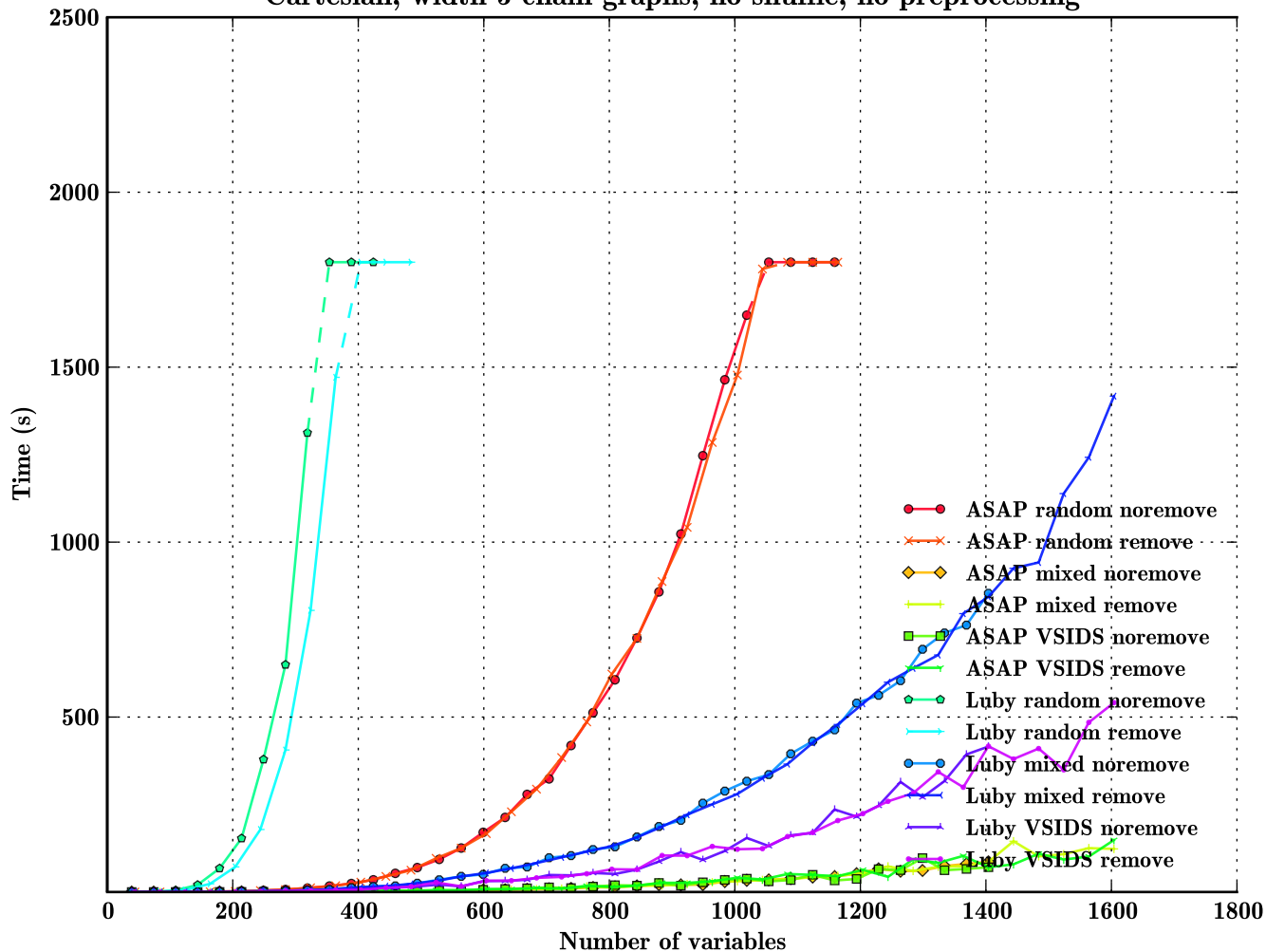




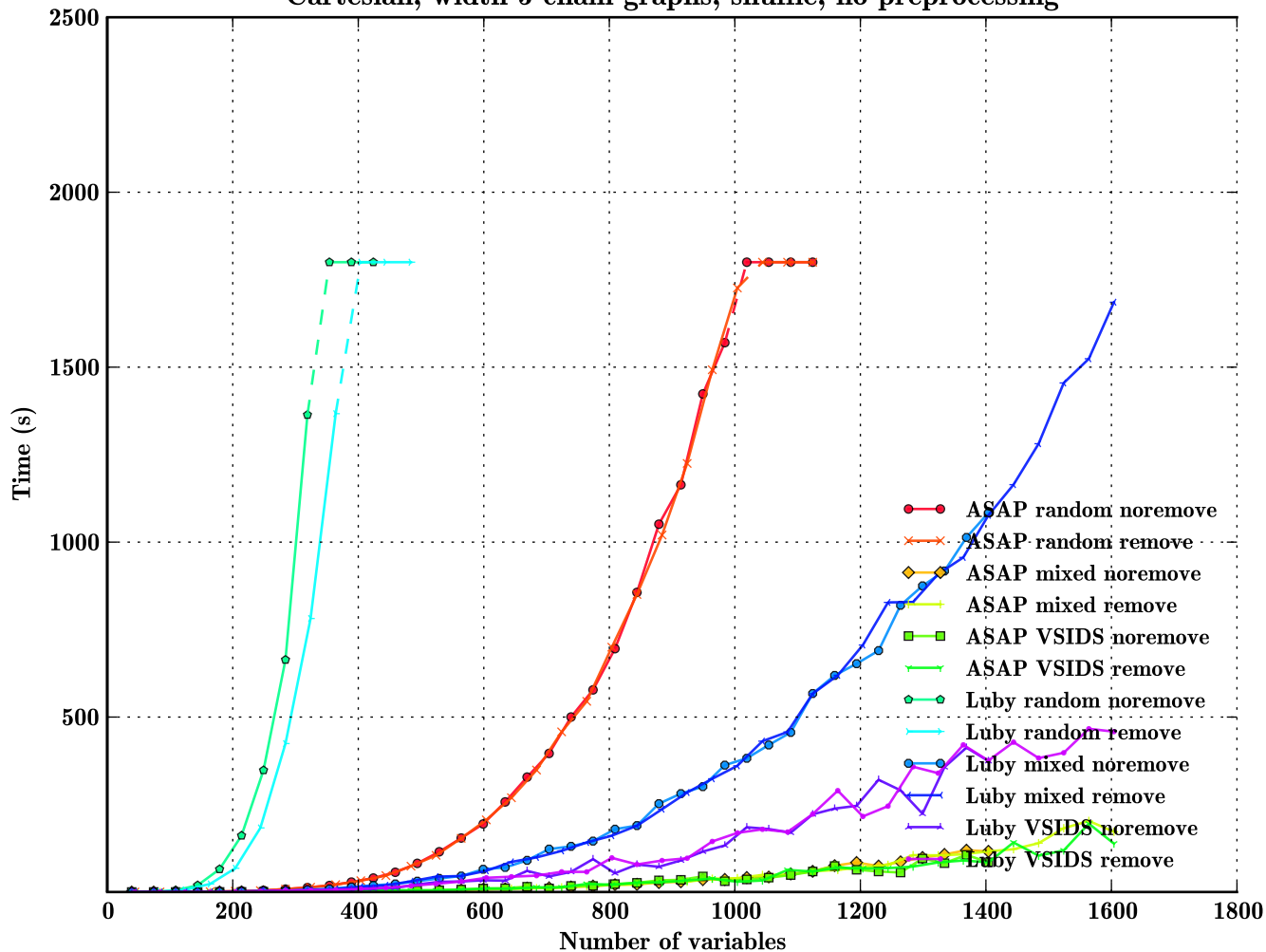
Cartesian, width 2 chain graphs, shuffle, preprocessing



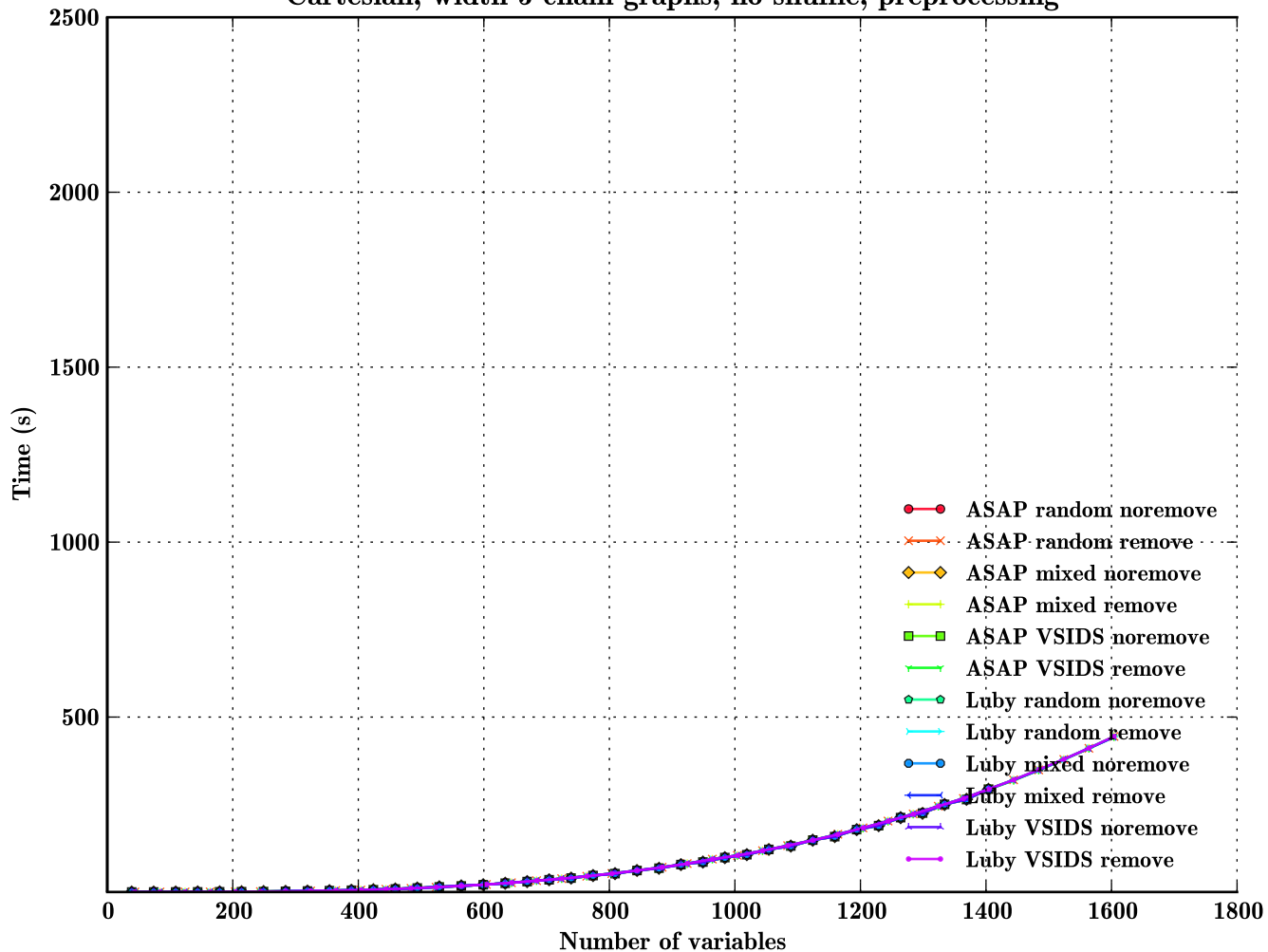
Cartesian, width 5 chain graphs, no shuffle, no preprocessing



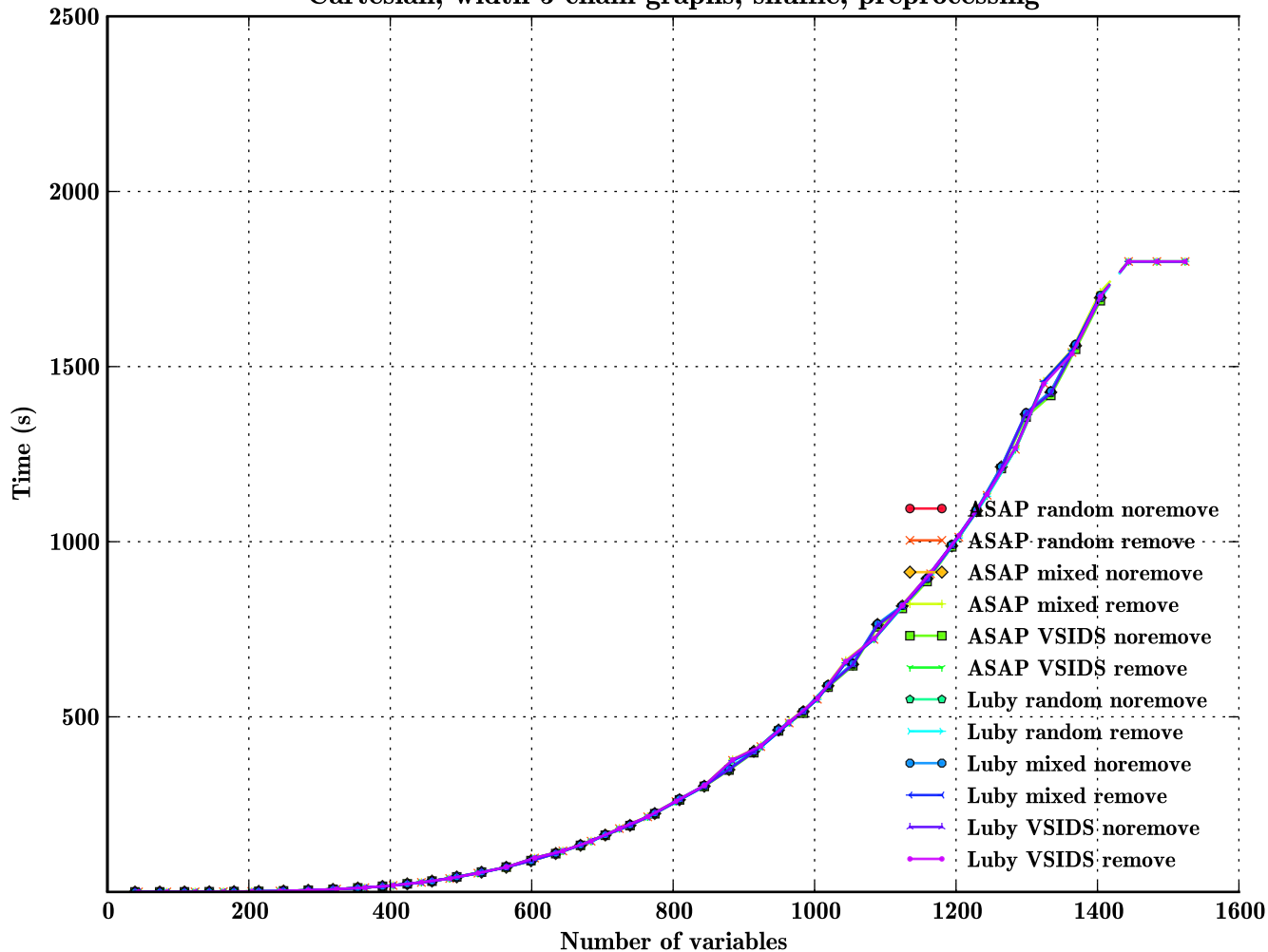
Cartesian, width 5 chain graphs, shuffle, no preprocessing



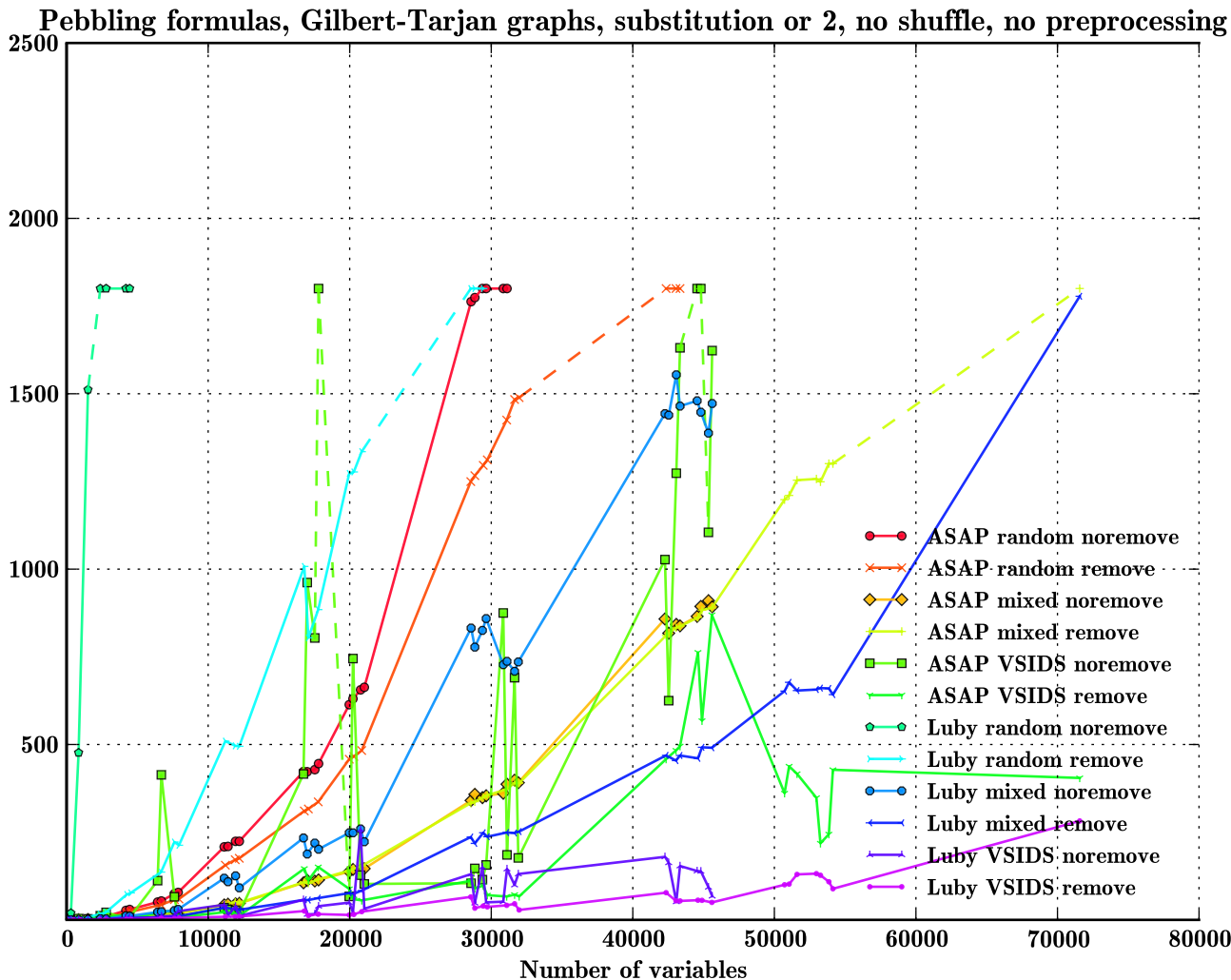
Cartesian, width 5 chain graphs, no shuffle, preprocessing



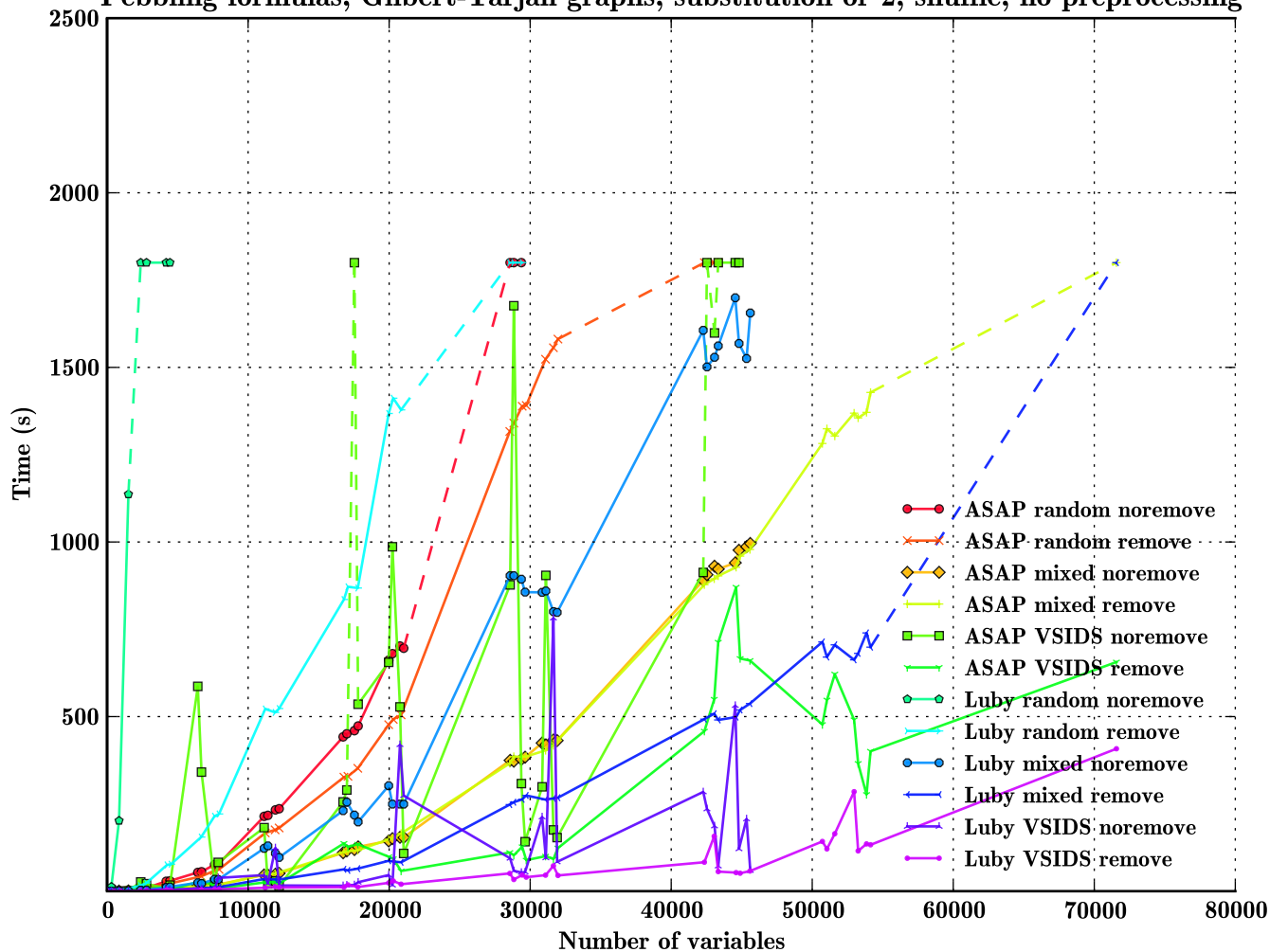
Cartesian, width 5 chain graphs, shuffle, preprocessing



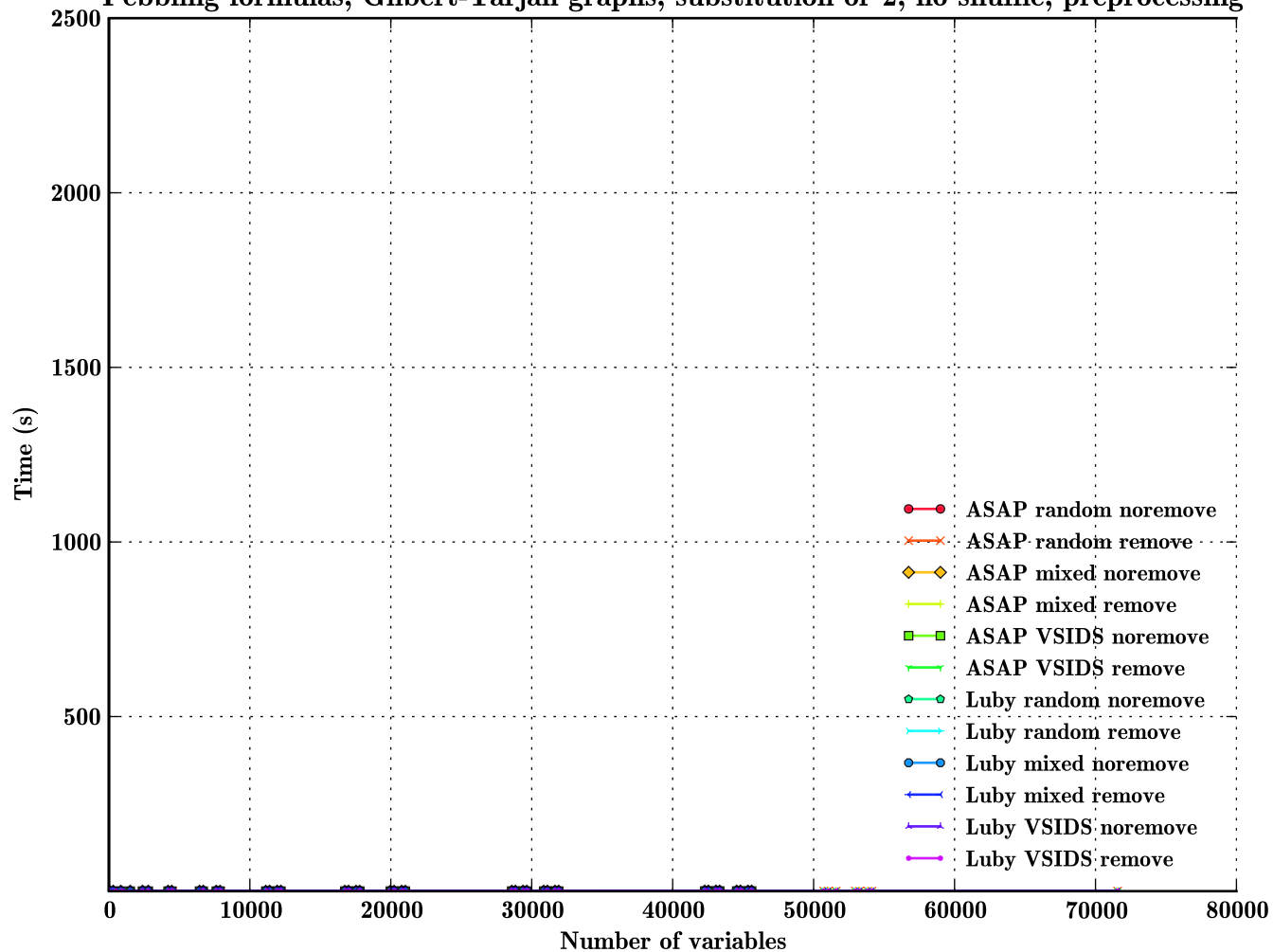
**Pebbling formulas with
substitution or of arity 2**



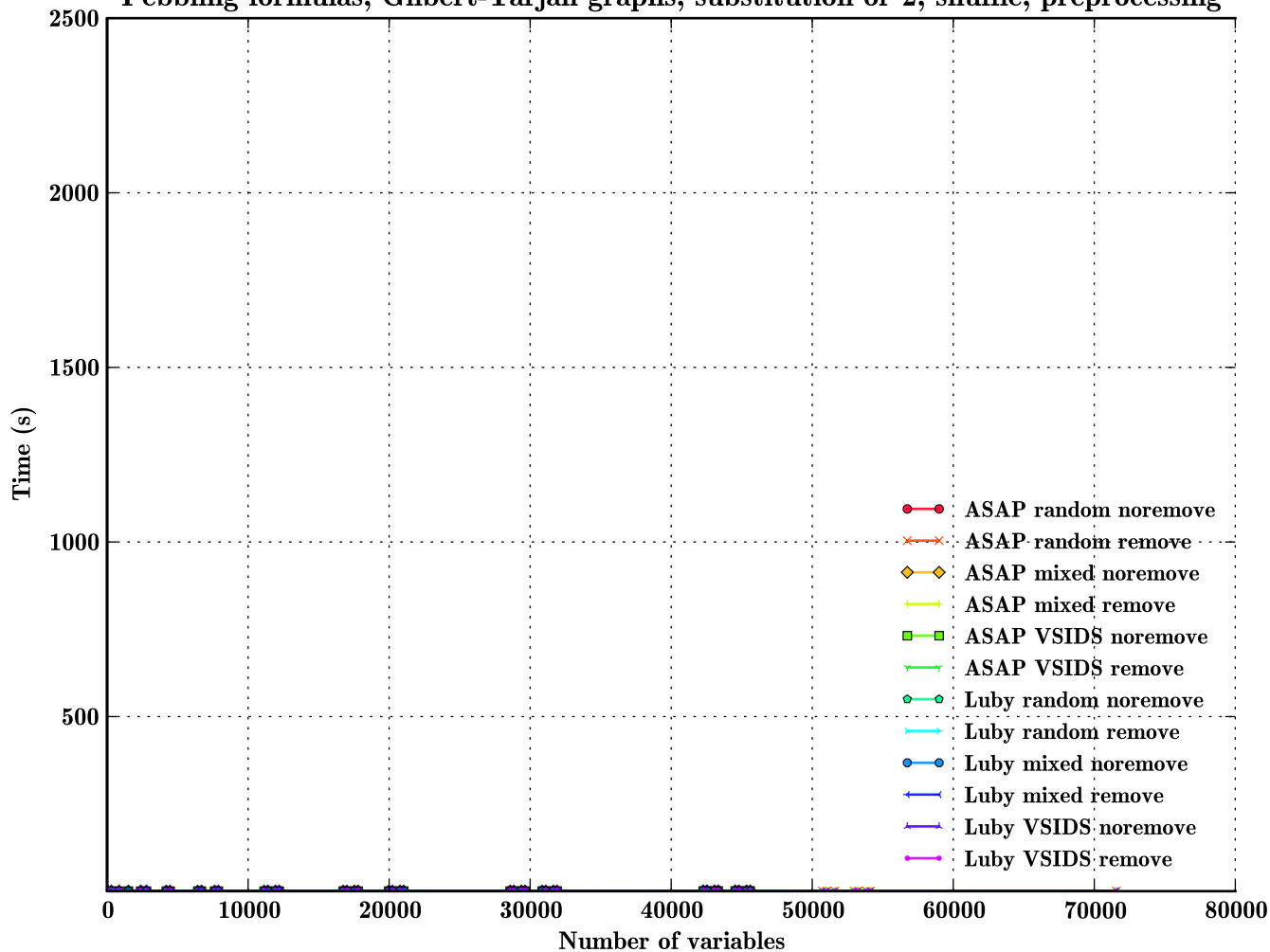
Pebbling formulas, Gilbert-Tarjan graphs, substitution or 2, shuffle, no preprocessing



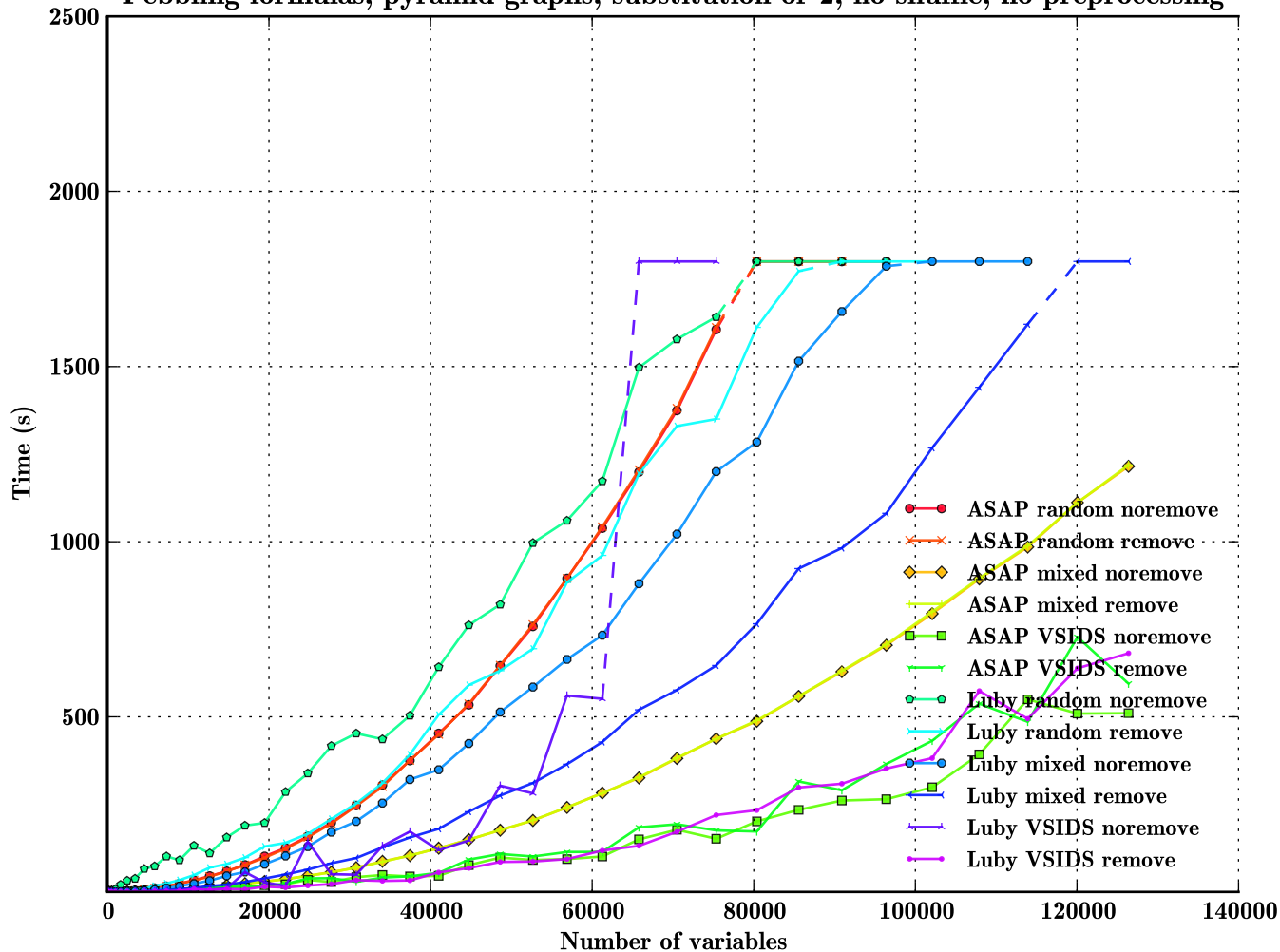
Pebbling formulas, Gilbert-Tarjan graphs, substitution or 2, no shuffle, preprocessing



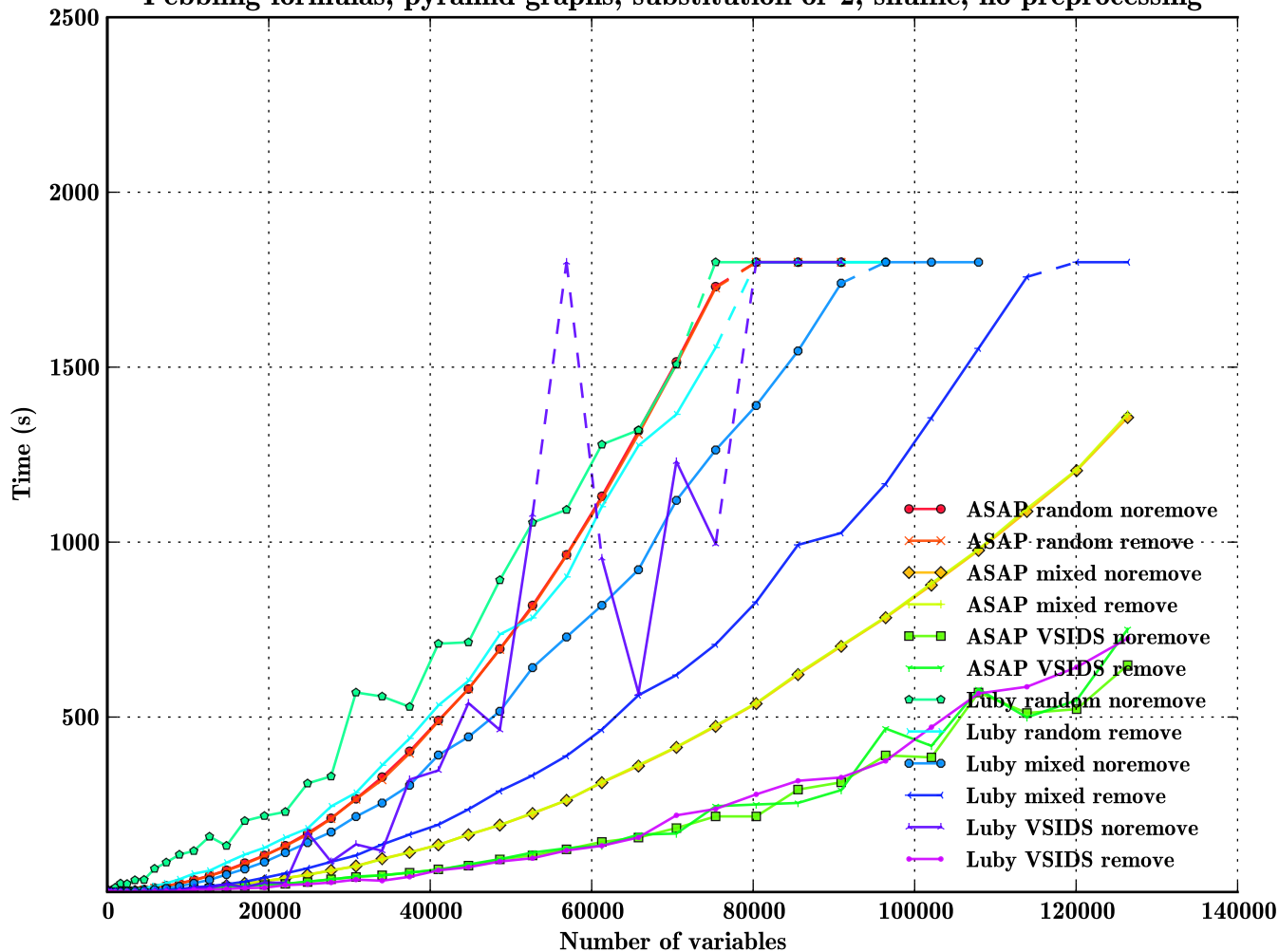
Pebbling formulas, Gilbert-Tarjan graphs, substitution or 2, shuffle, preprocessing



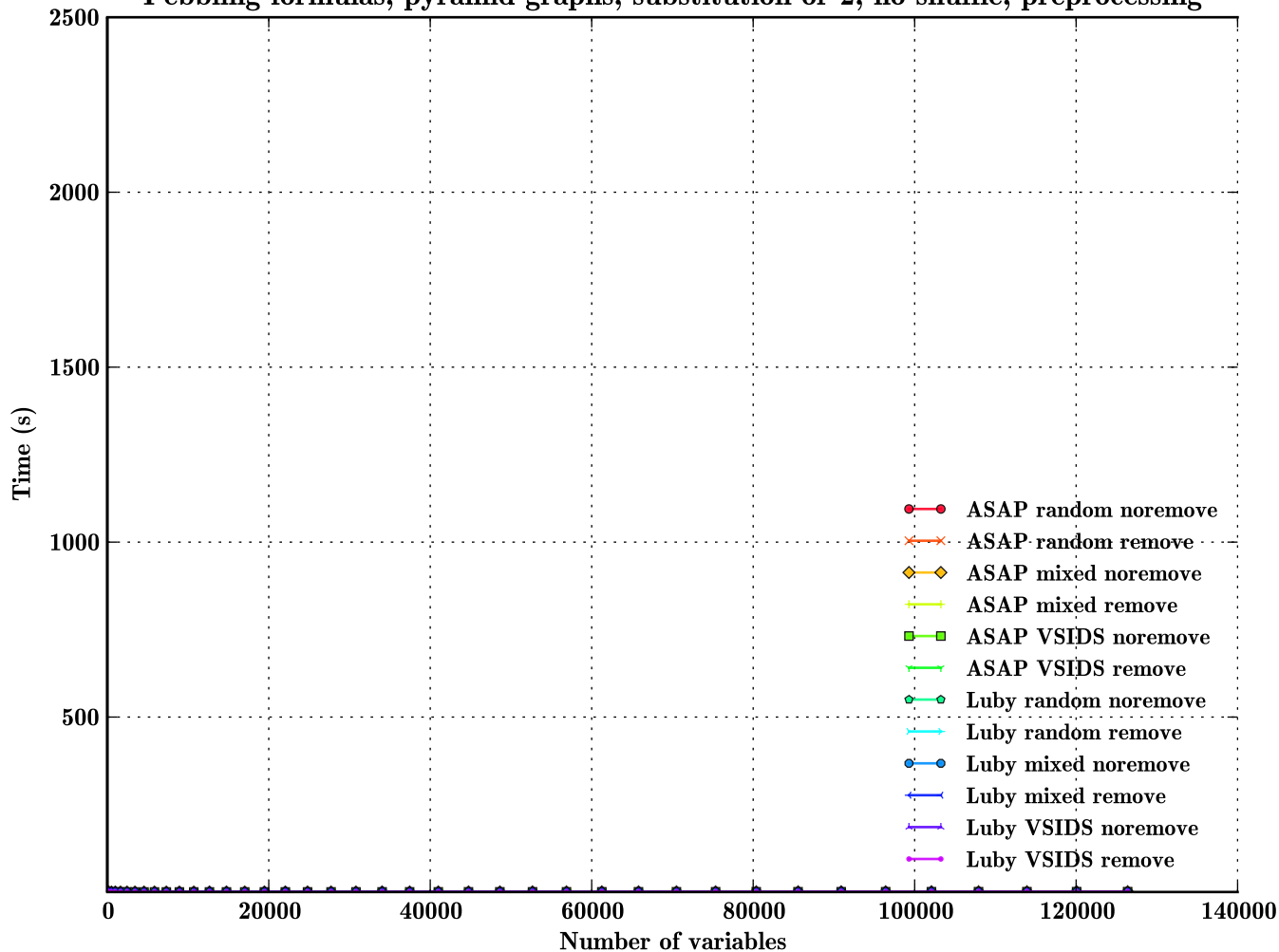
Pebbling formulas, pyramid graphs, substitution or 2, no shuffle, no preprocessing



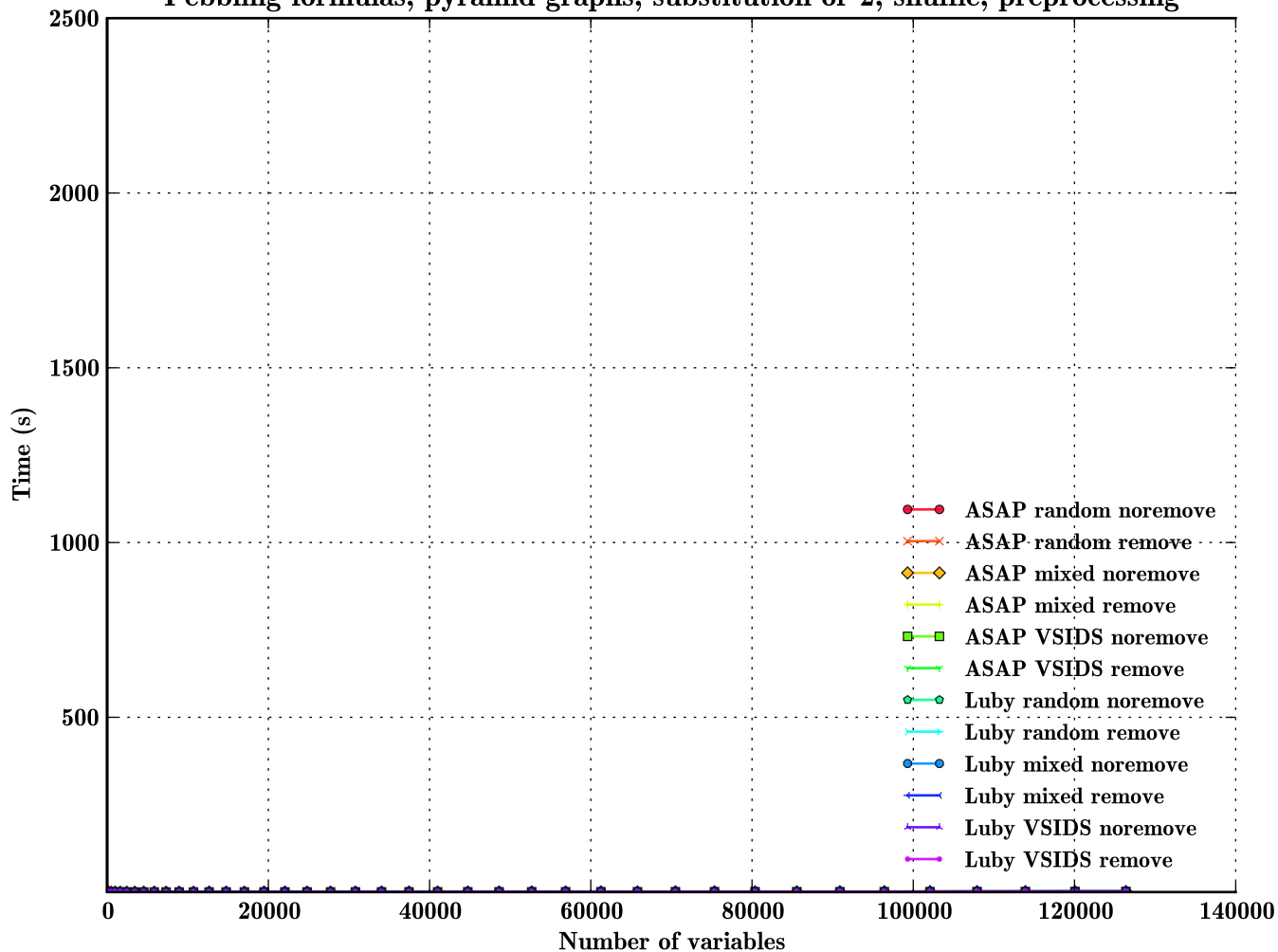
Pebbling formulas, pyramid graphs, substitution or 2, shuffle, no preprocessing



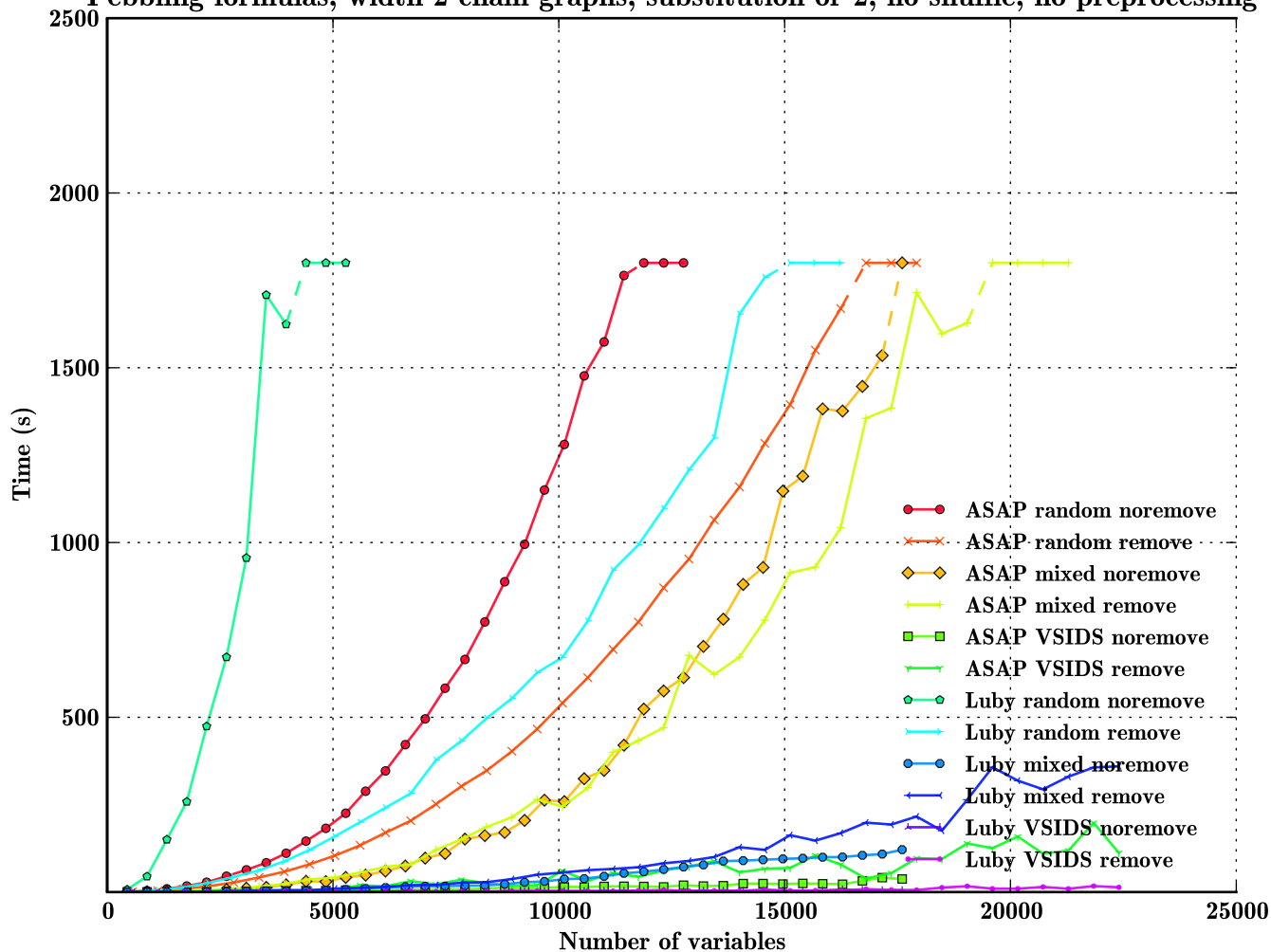
Pebbling formulas, pyramid graphs, substitution or 2, no shuffle, preprocessing



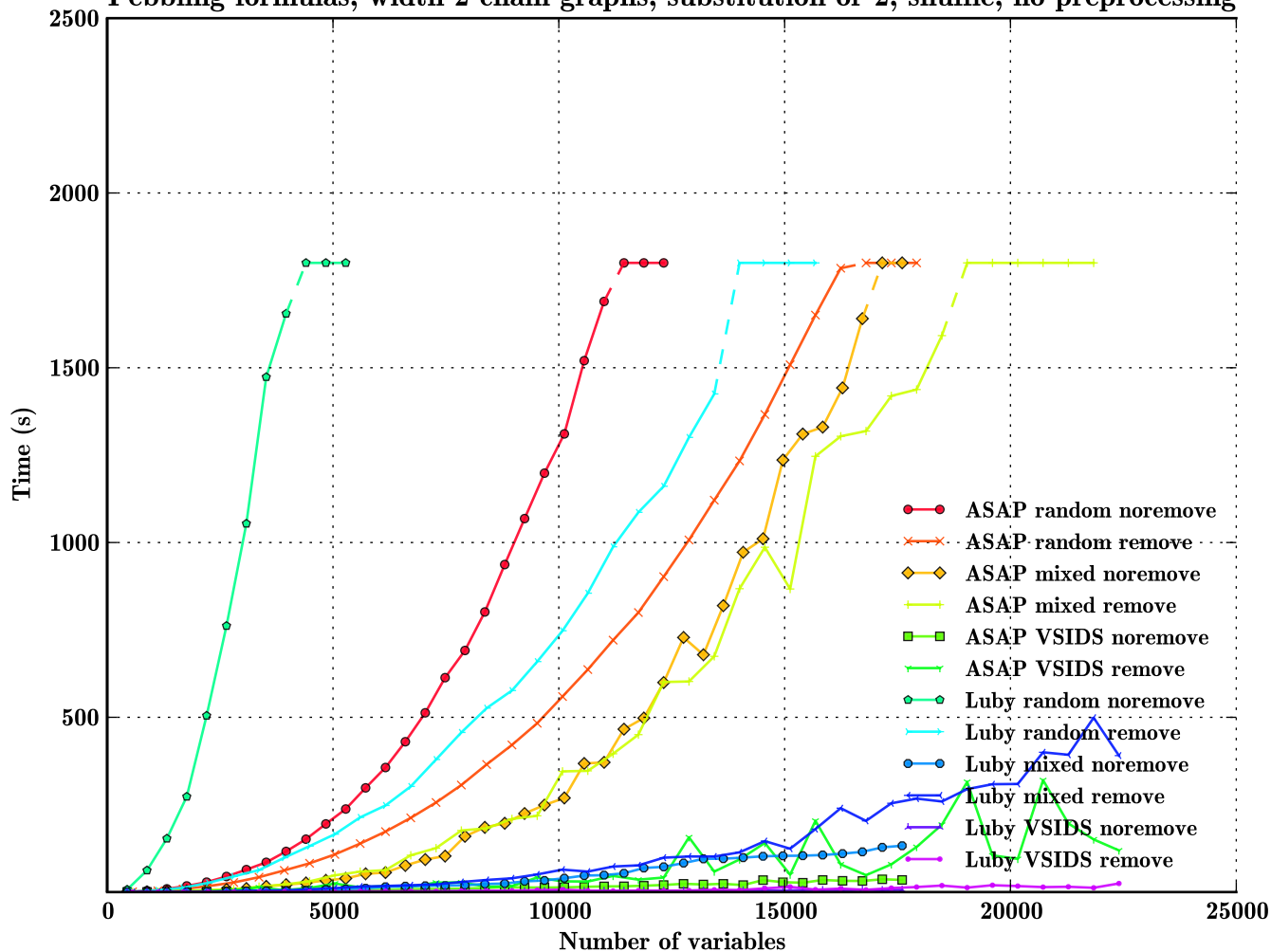
Pebbling formulas, pyramid graphs, substitution or 2, shuffle, preprocessing



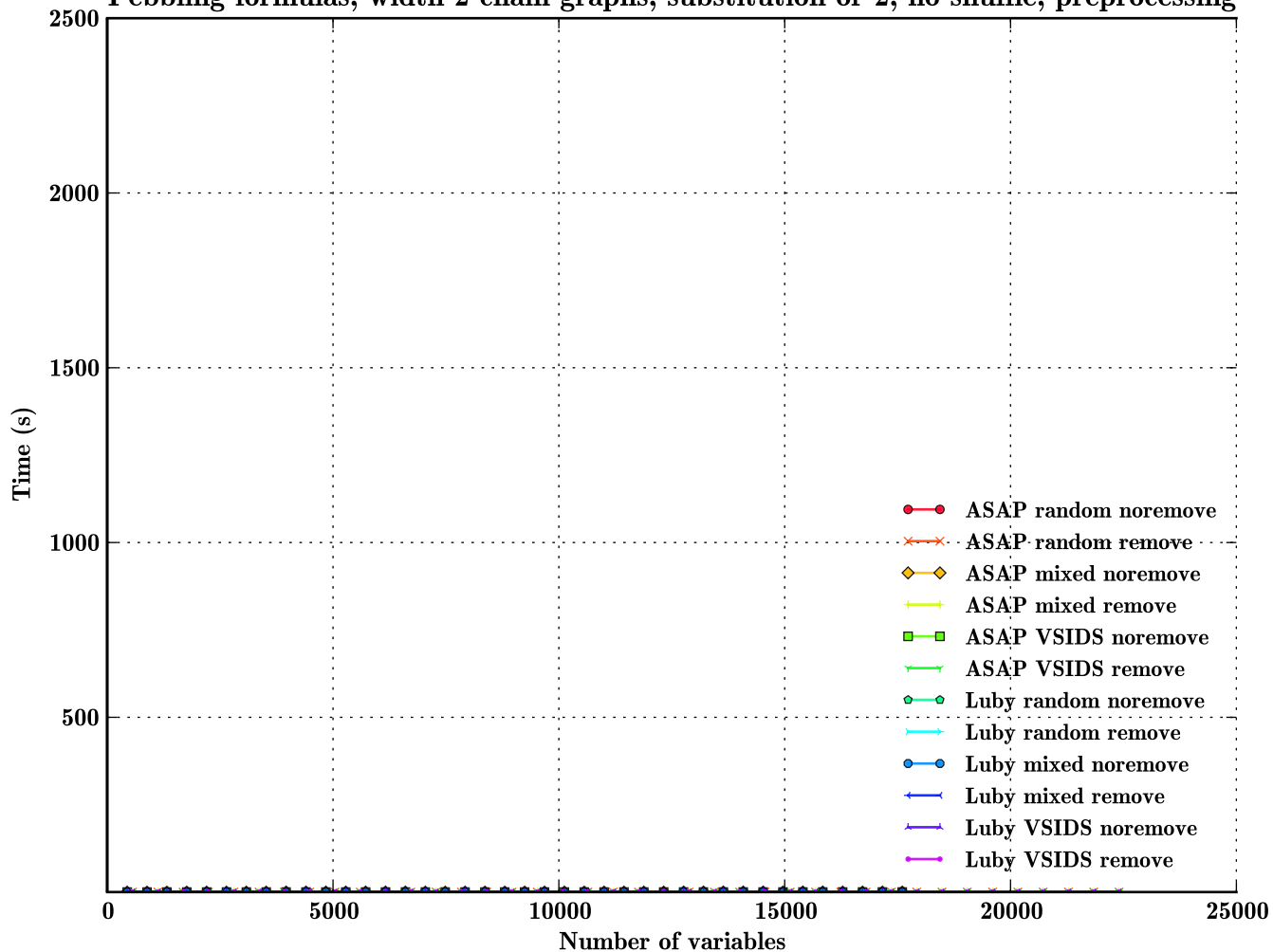
Pebbling formulas, width 2 chain graphs, substitution or 2, no shuffle, no preprocessing



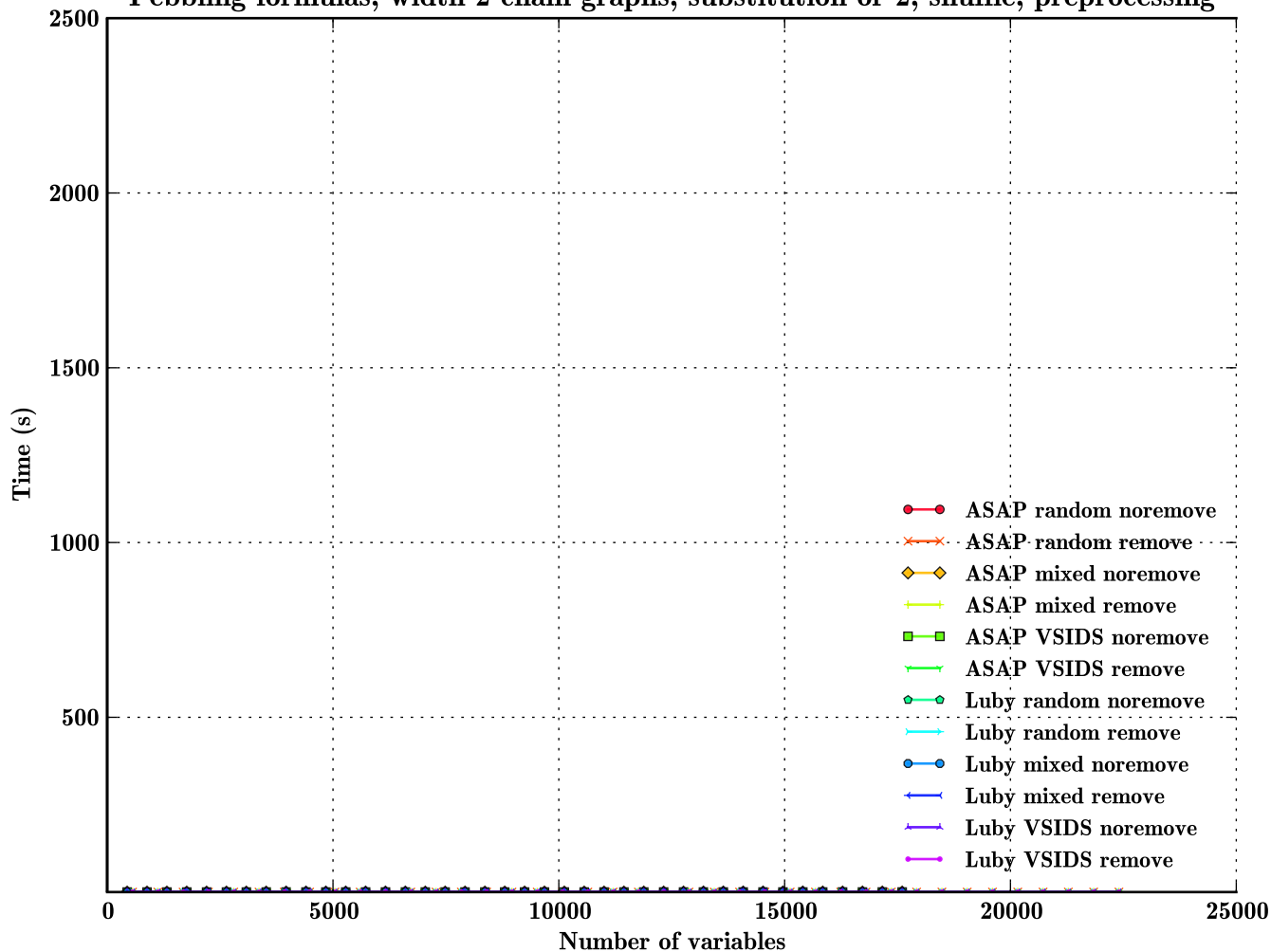
Pebbling formulas, width 2 chain graphs, substitution or 2, shuffle, no preprocessing



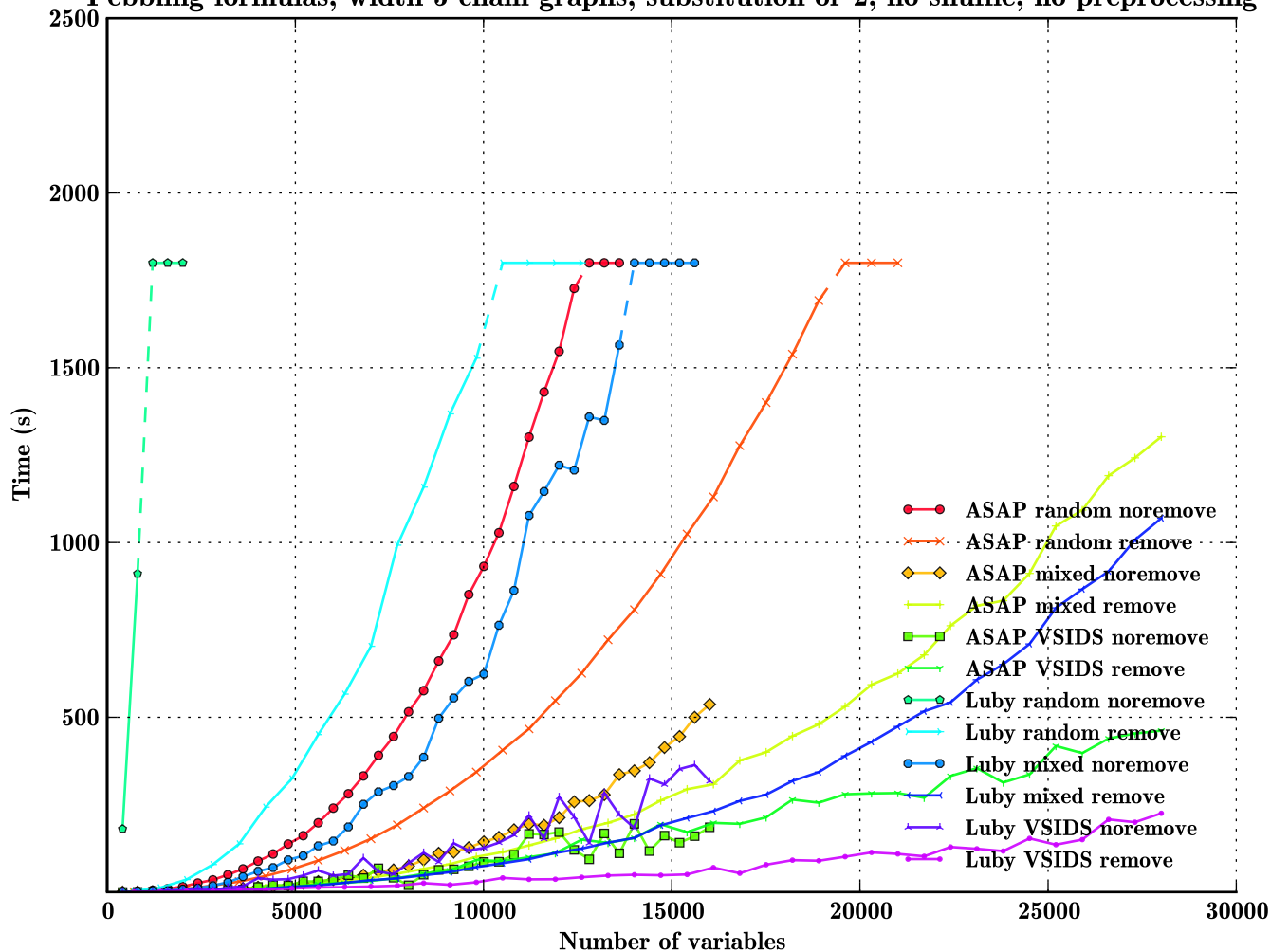
Pebbling formulas, width 2 chain graphs, substitution or 2, no shuffle, preprocessing



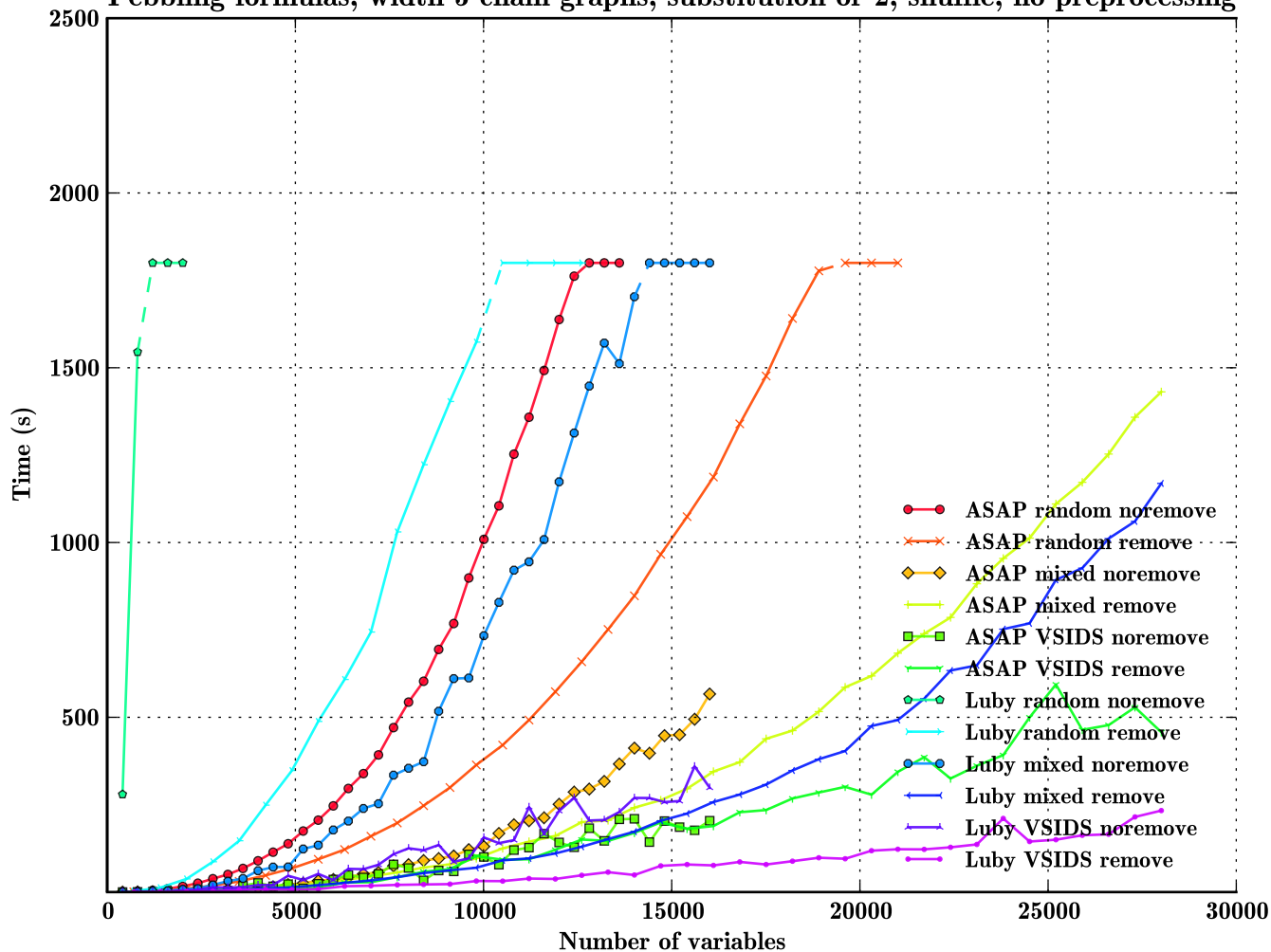
Pebbling formulas, width 2 chain graphs, substitution or 2, shuffle, preprocessing



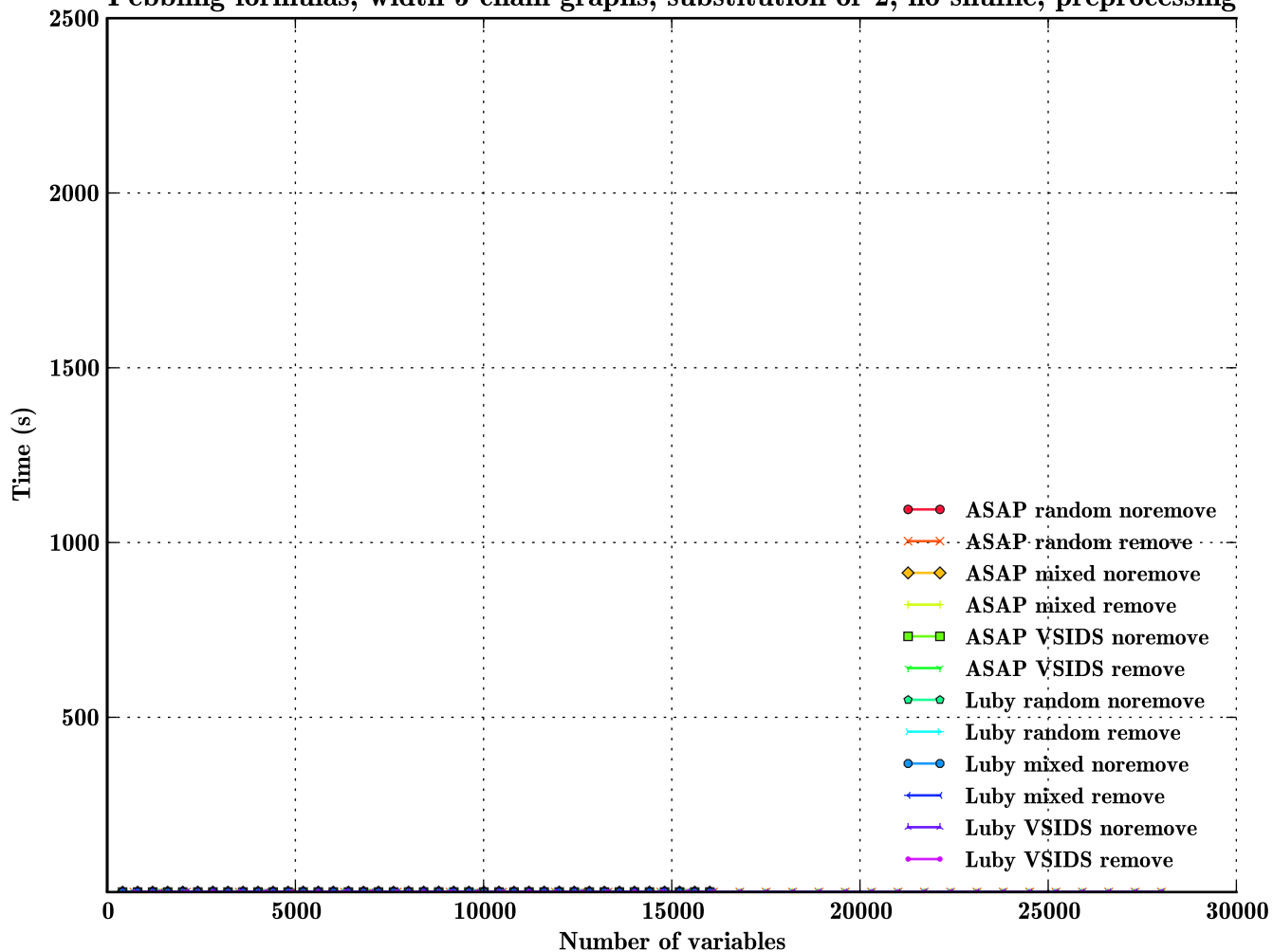
Pebbling formulas, width 5 chain graphs, substitution or 2, no shuffle, no preprocessing



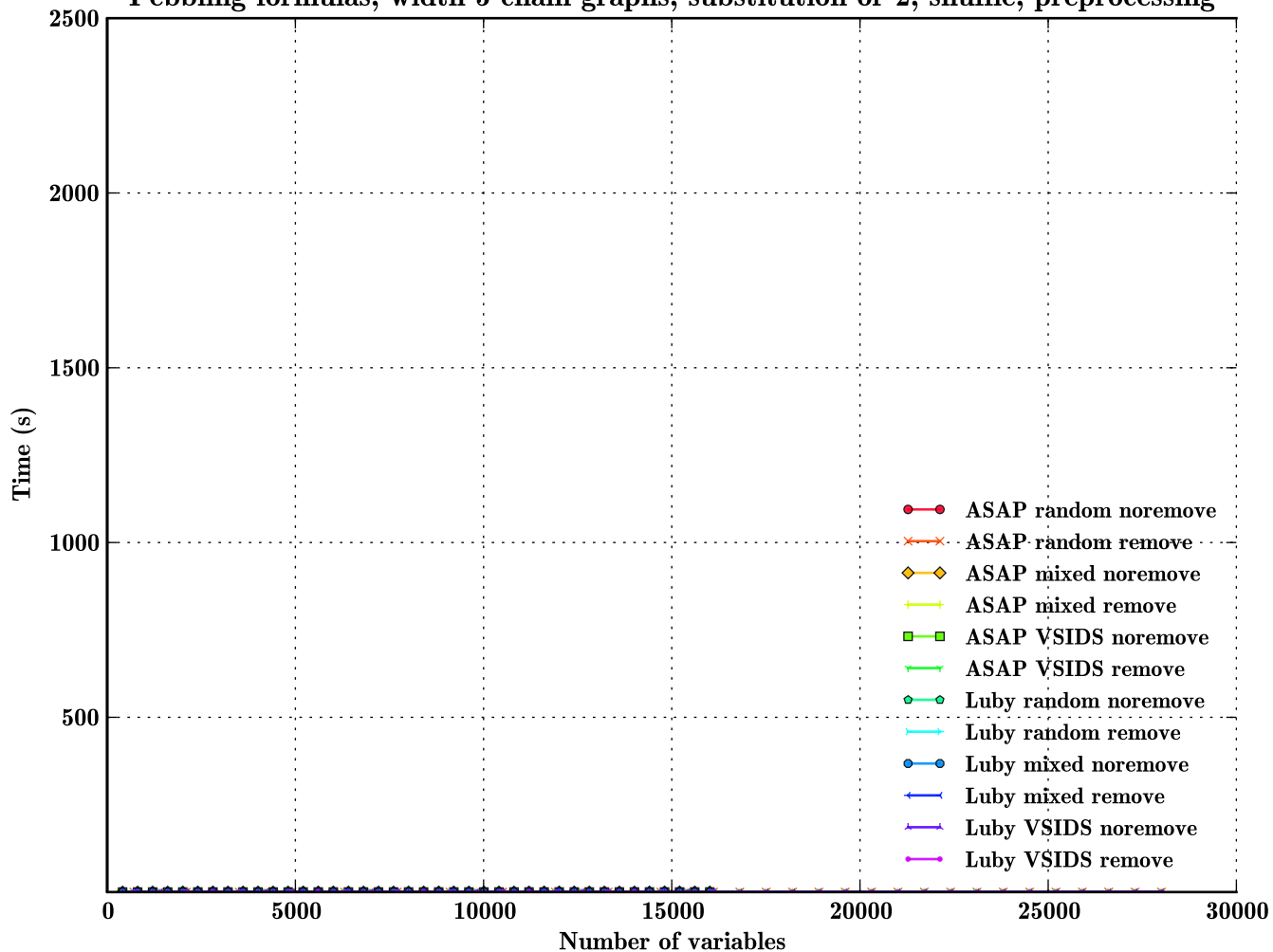
Pebbling formulas, width 5 chain graphs, substitution or 2, shuffle, no preprocessing



Pebbling formulas, width 5 chain graphs, substitution or 2, no shuffle, preprocessing

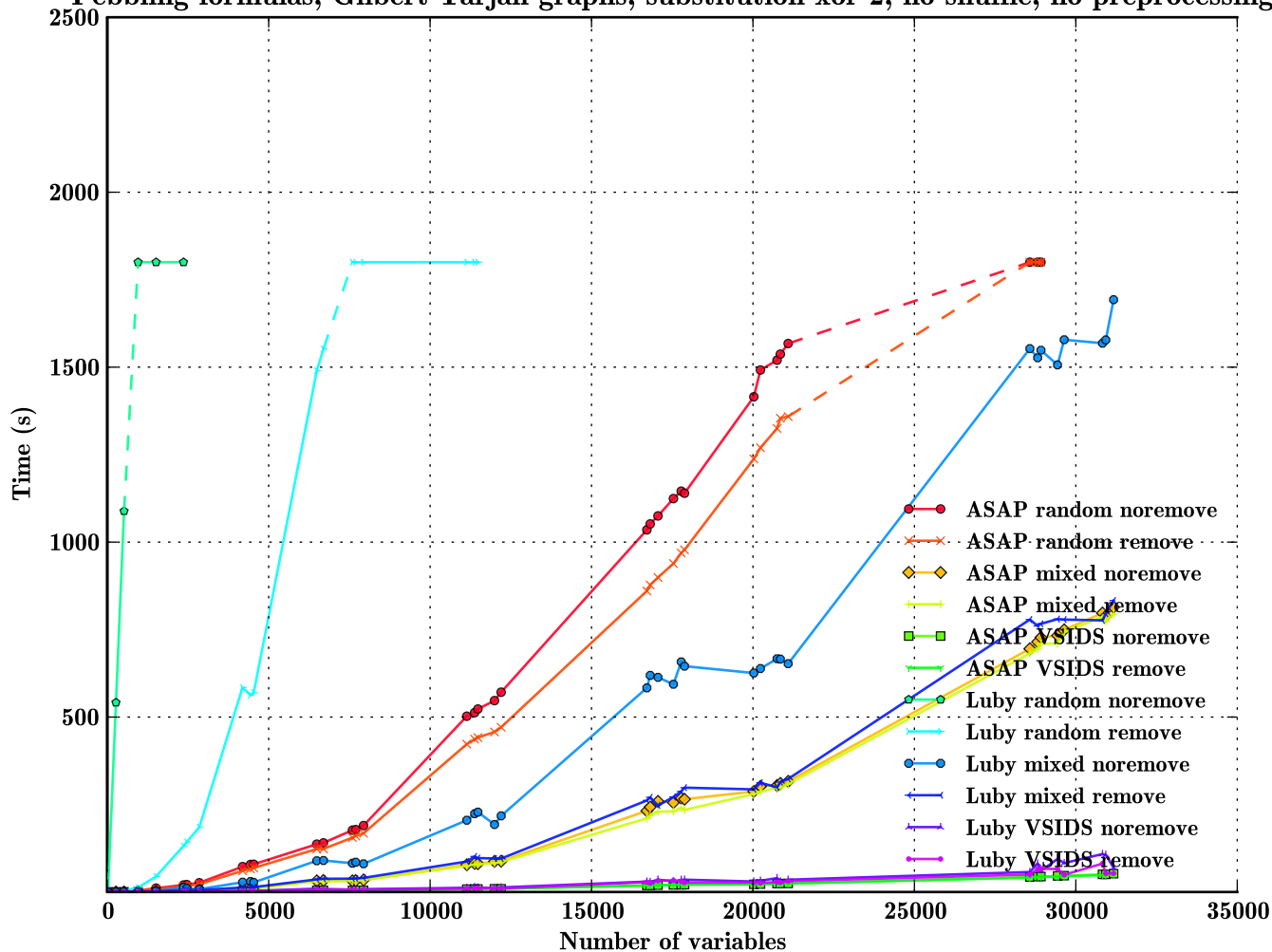


Pebbling formulas, width 5 chain graphs, substitution or 2, shuffle, preprocessing

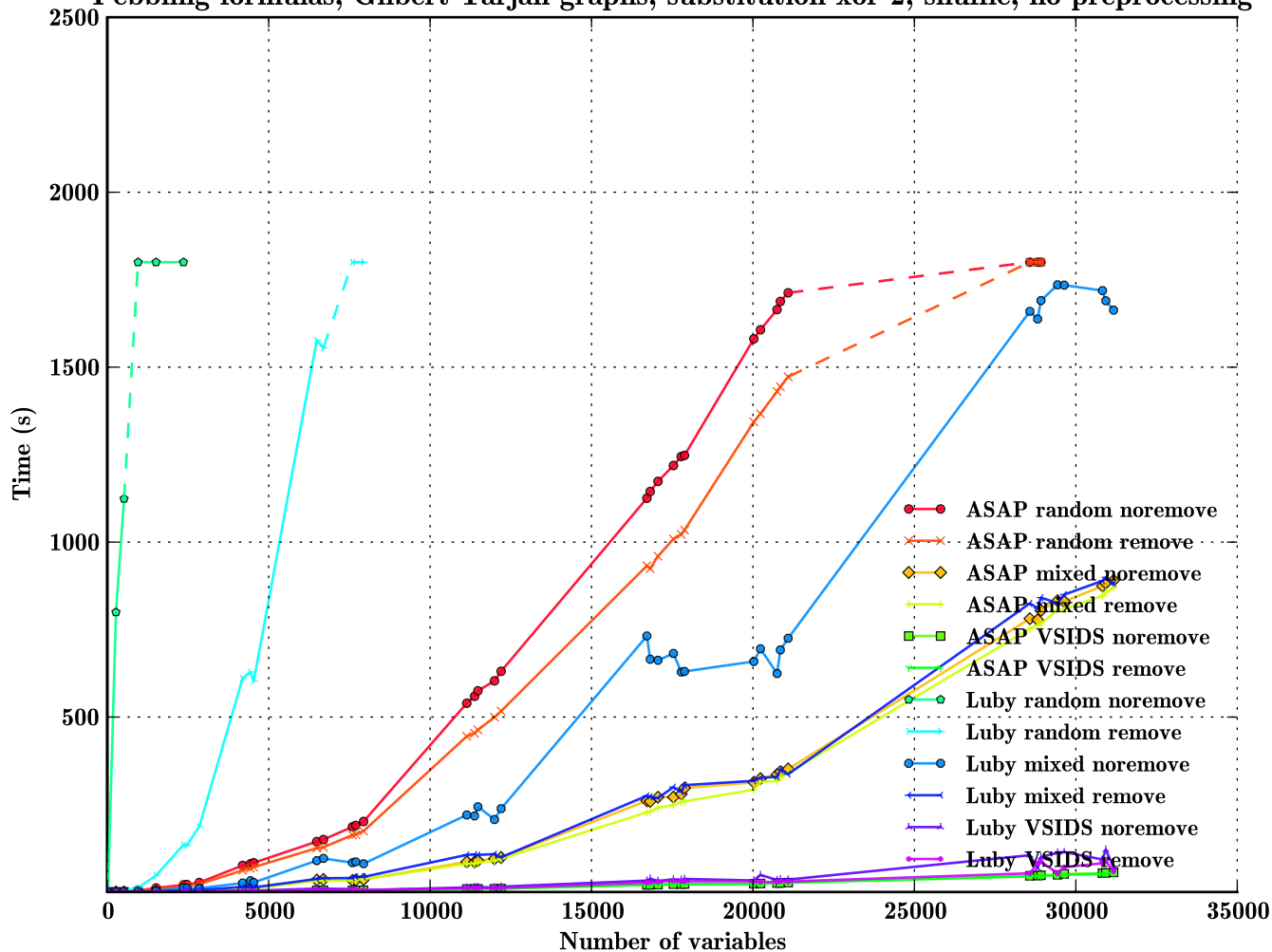


**Pebbling formulas with
substitution xor of arity 2**

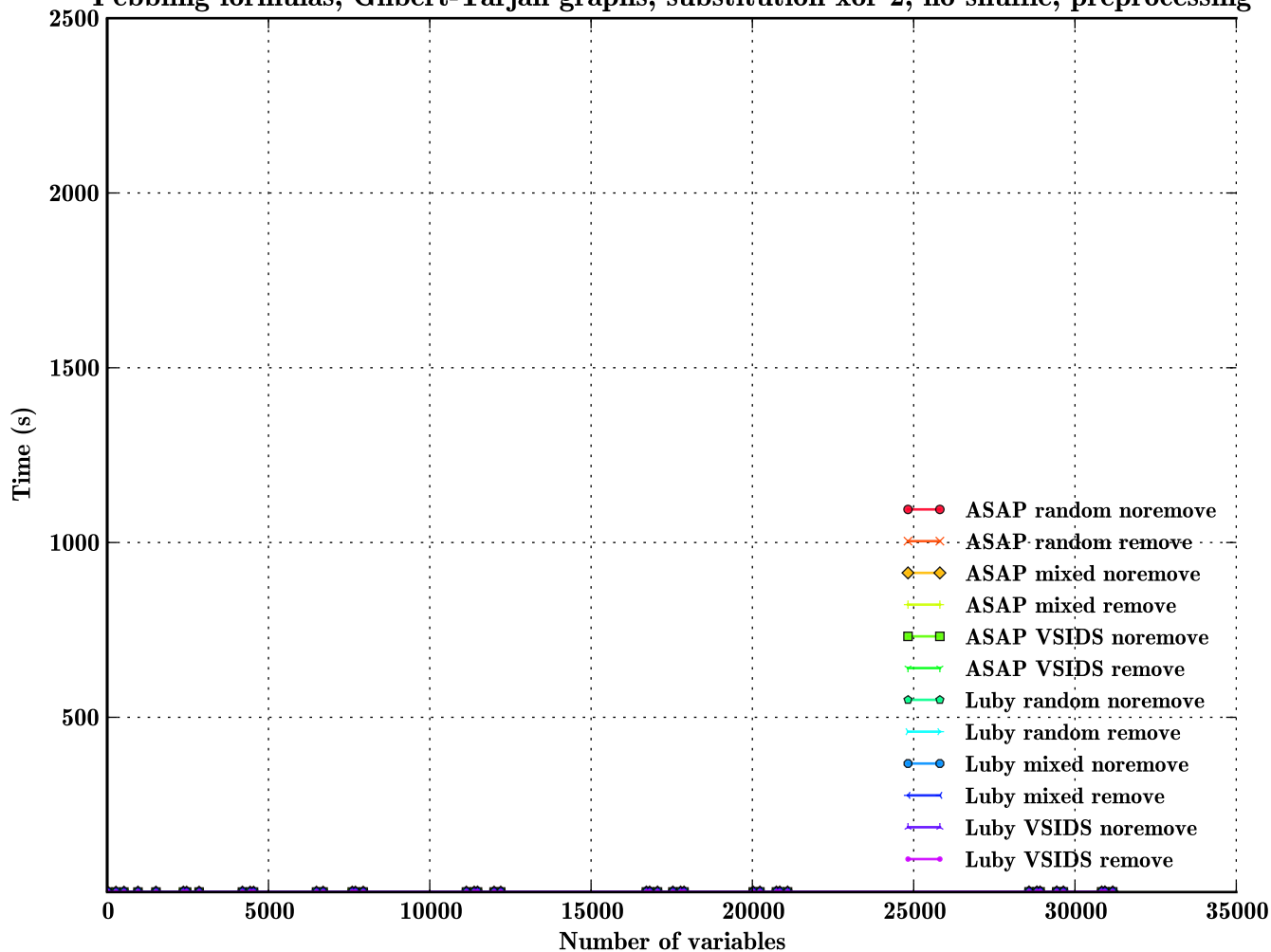
Pebbling formulas, Gilbert-Tarjan graphs, substitution xor 2, no shuffle, no preprocessing



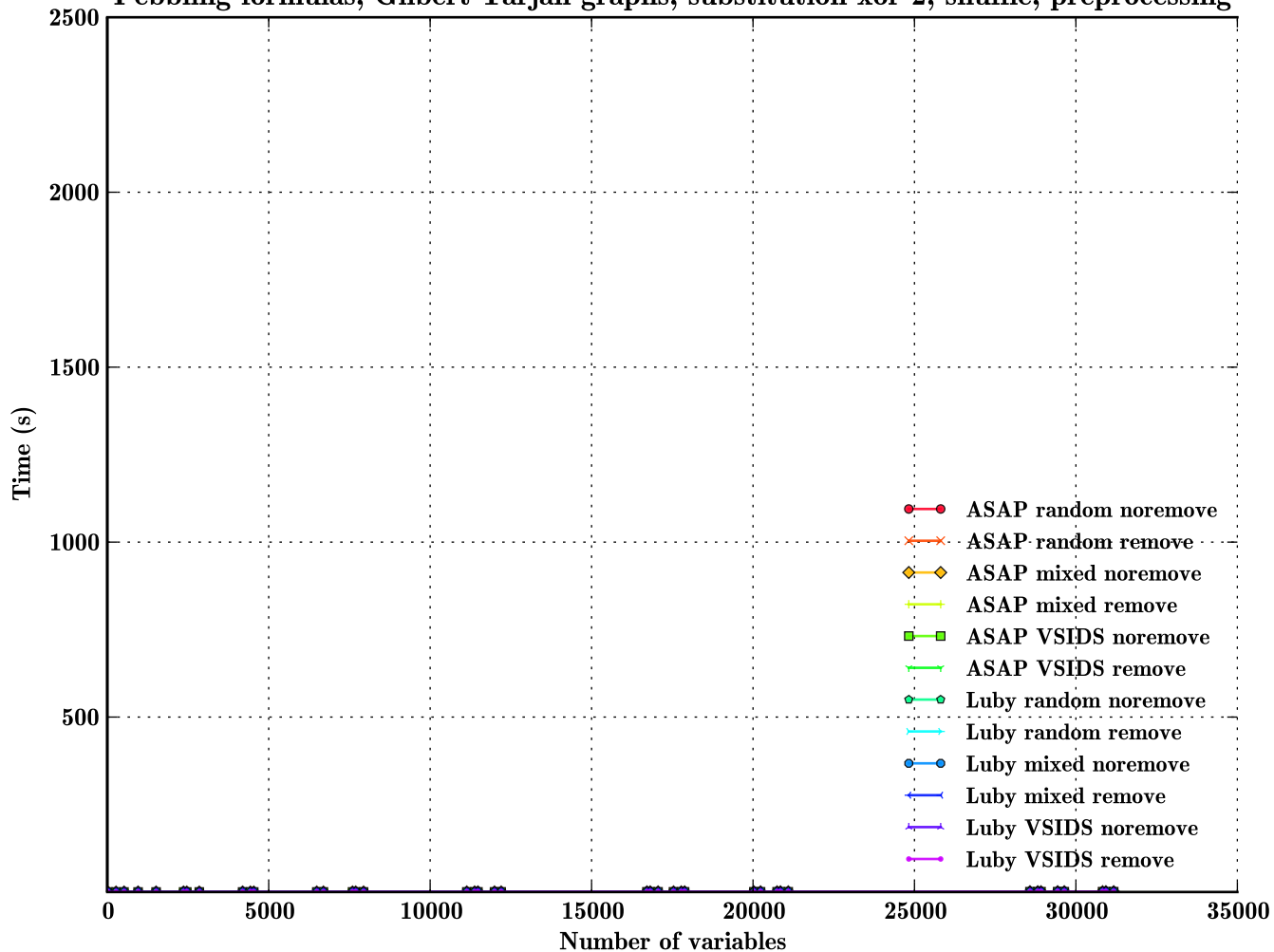
Pebbling formulas, Gilbert-Tarjan graphs, substitution xor 2, shuffle, no preprocessing



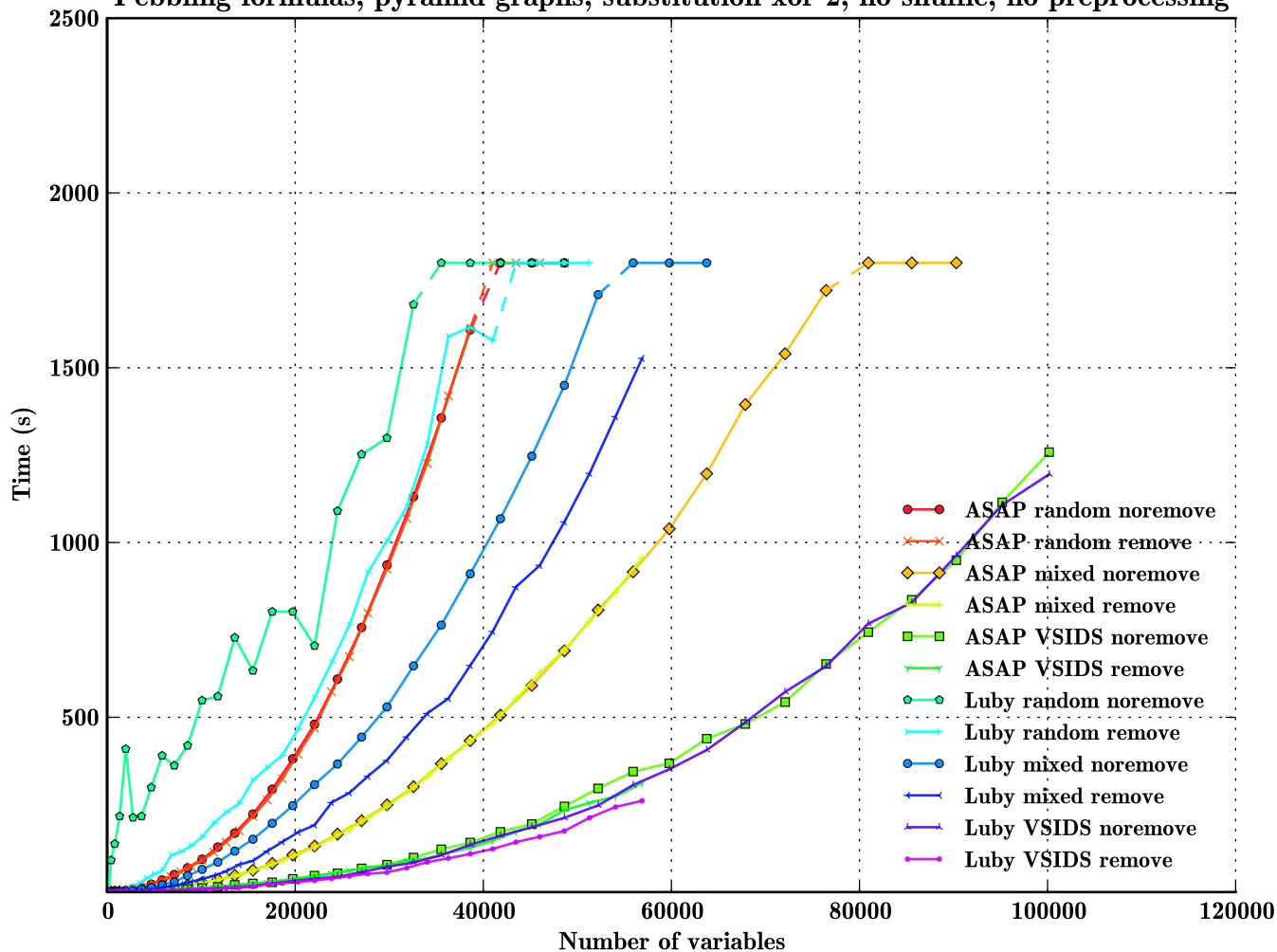
Pebbling formulas, Gilbert-Tarjan graphs, substitution xor 2, no shuffle, preprocessing



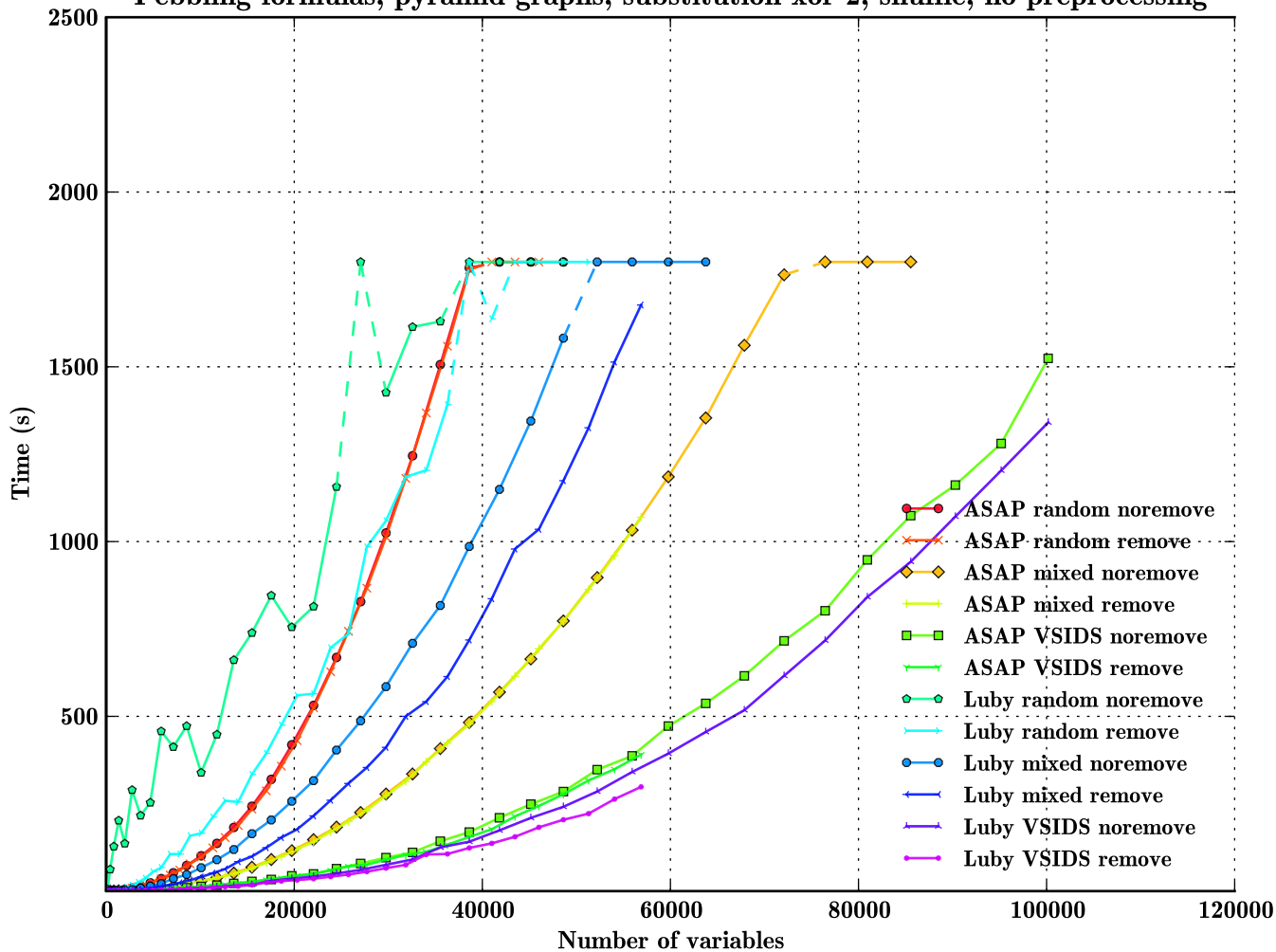
Pebbling formulas, Gilbert-Tarjan graphs, substitution xor 2, shuffle, preprocessing



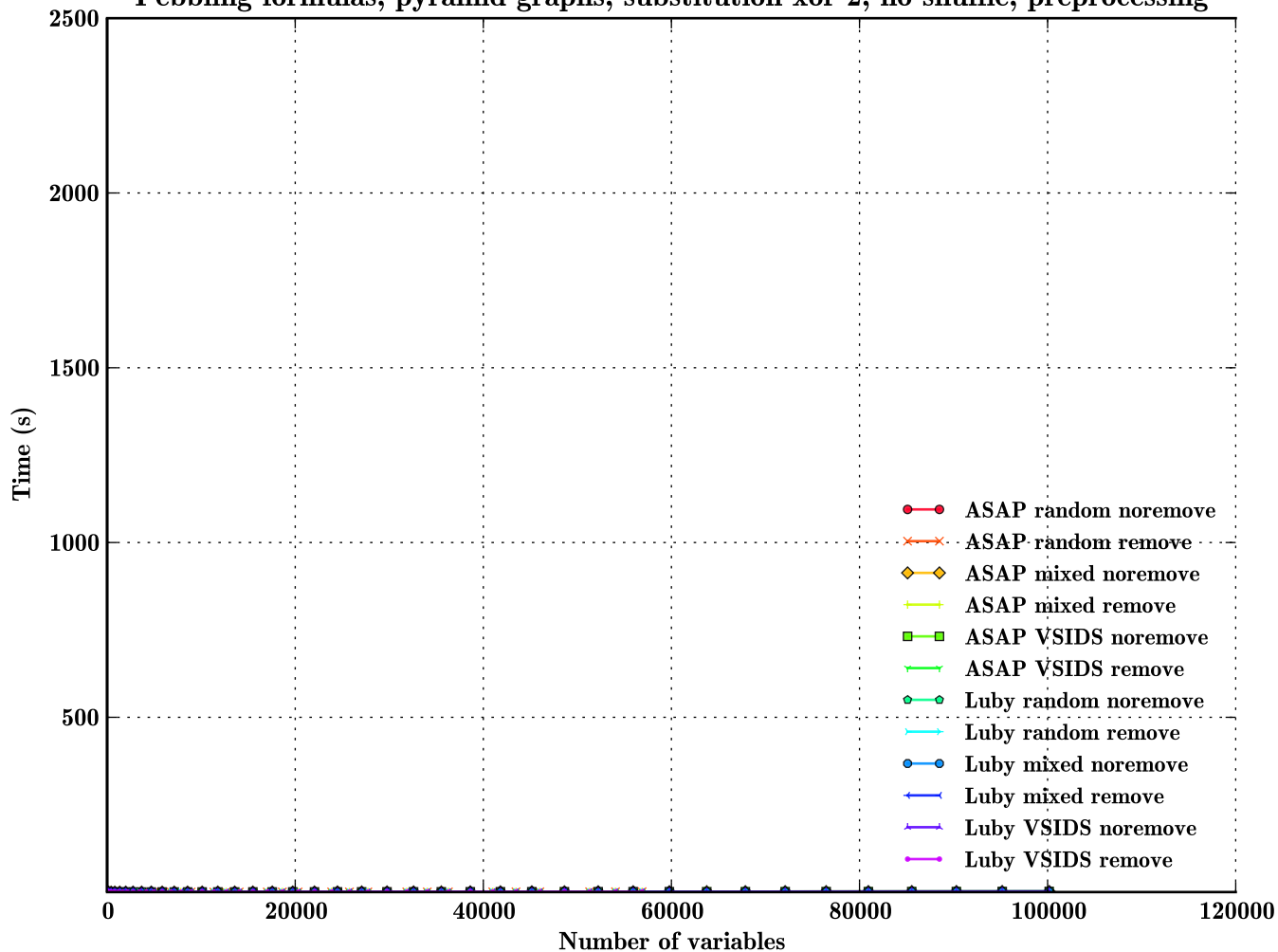
Pebbling formulas, pyramid graphs, substitution xor 2, no shuffle, no preprocessing



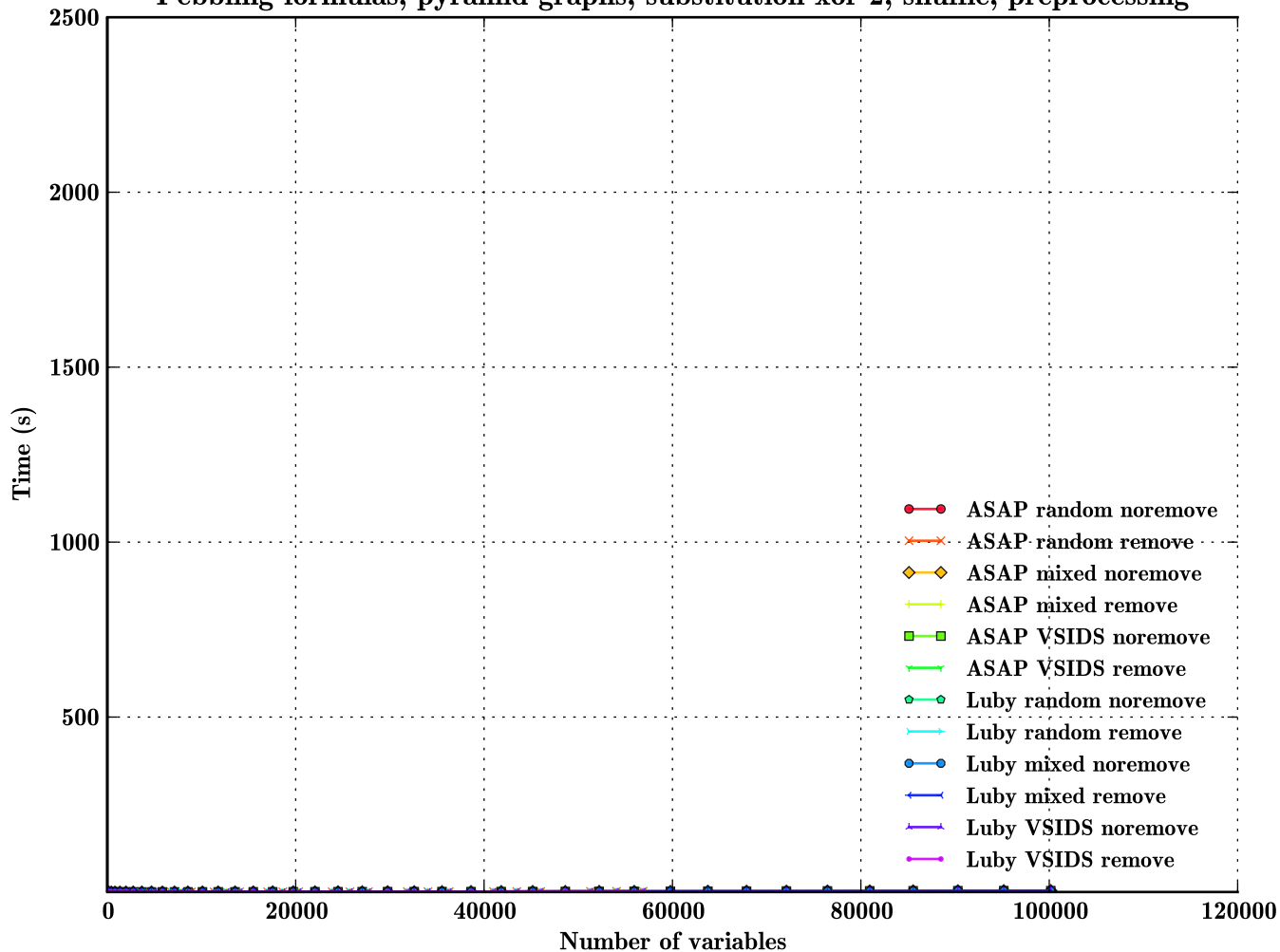
Pebbling formulas, pyramid graphs, substitution xor 2, shuffle, no preprocessing



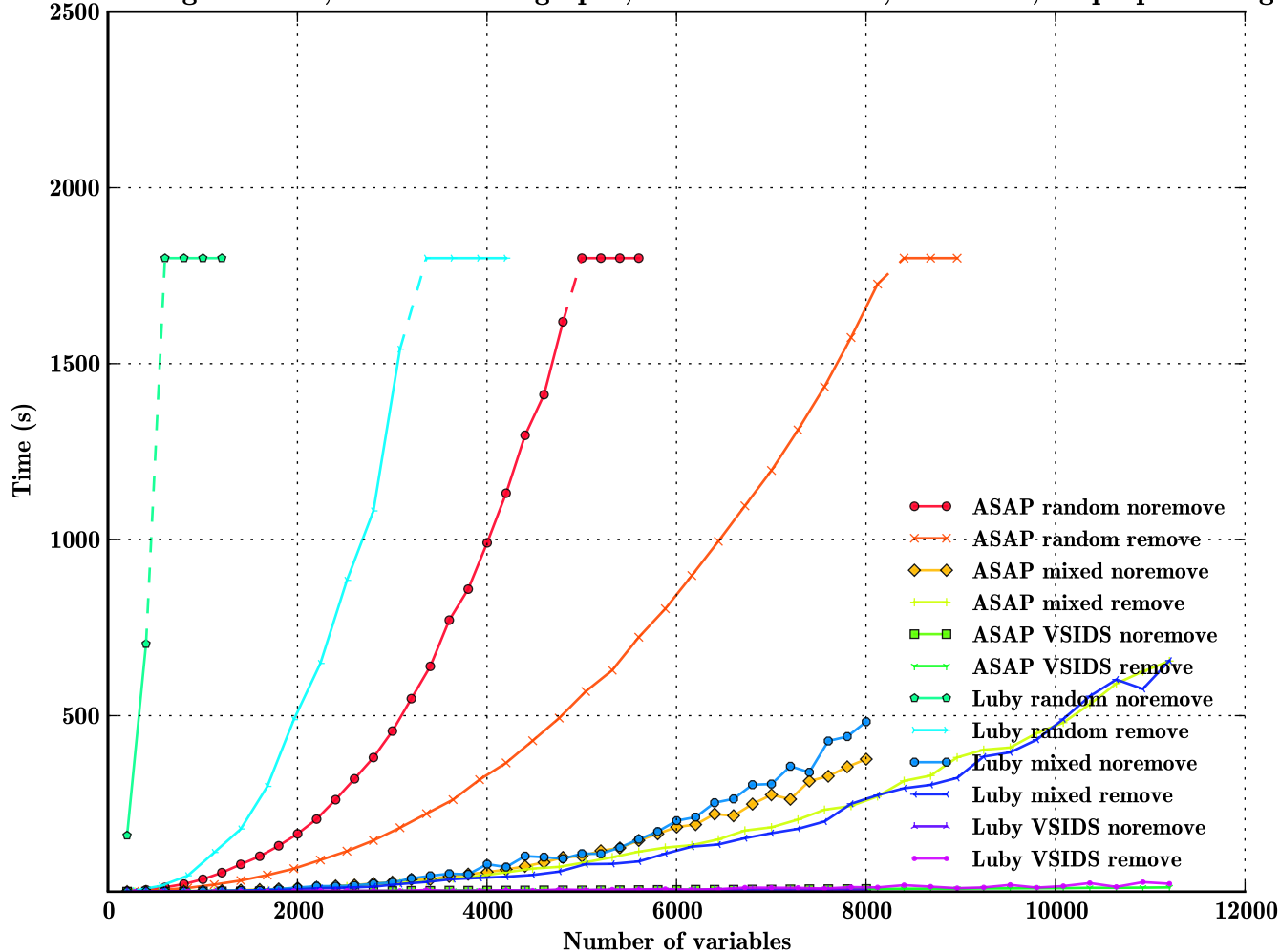
Pebbling formulas, pyramid graphs, substitution xor 2, no shuffle, preprocessing



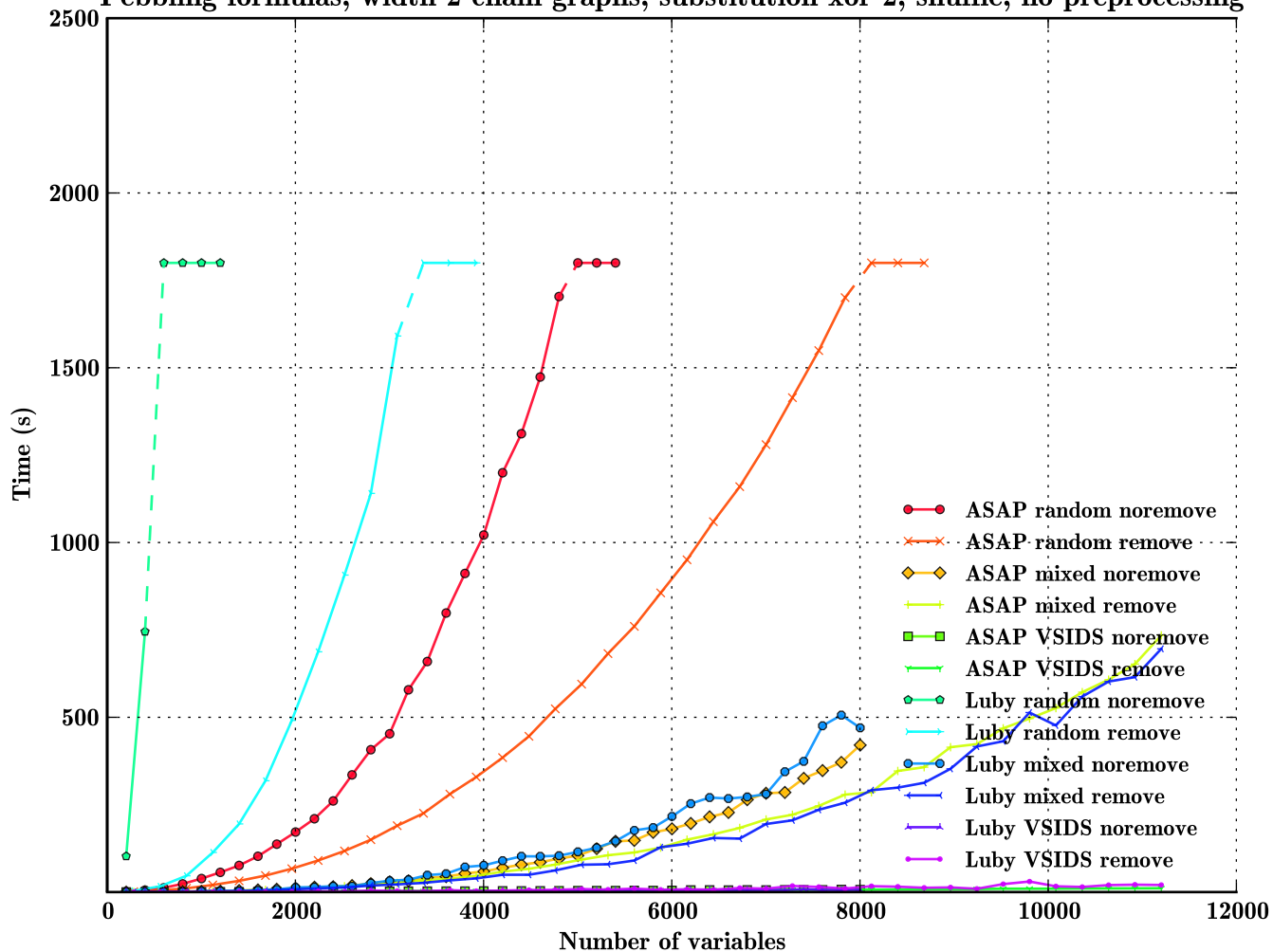
Pebbling formulas, pyramid graphs, substitution xor 2, shuffle, preprocessing



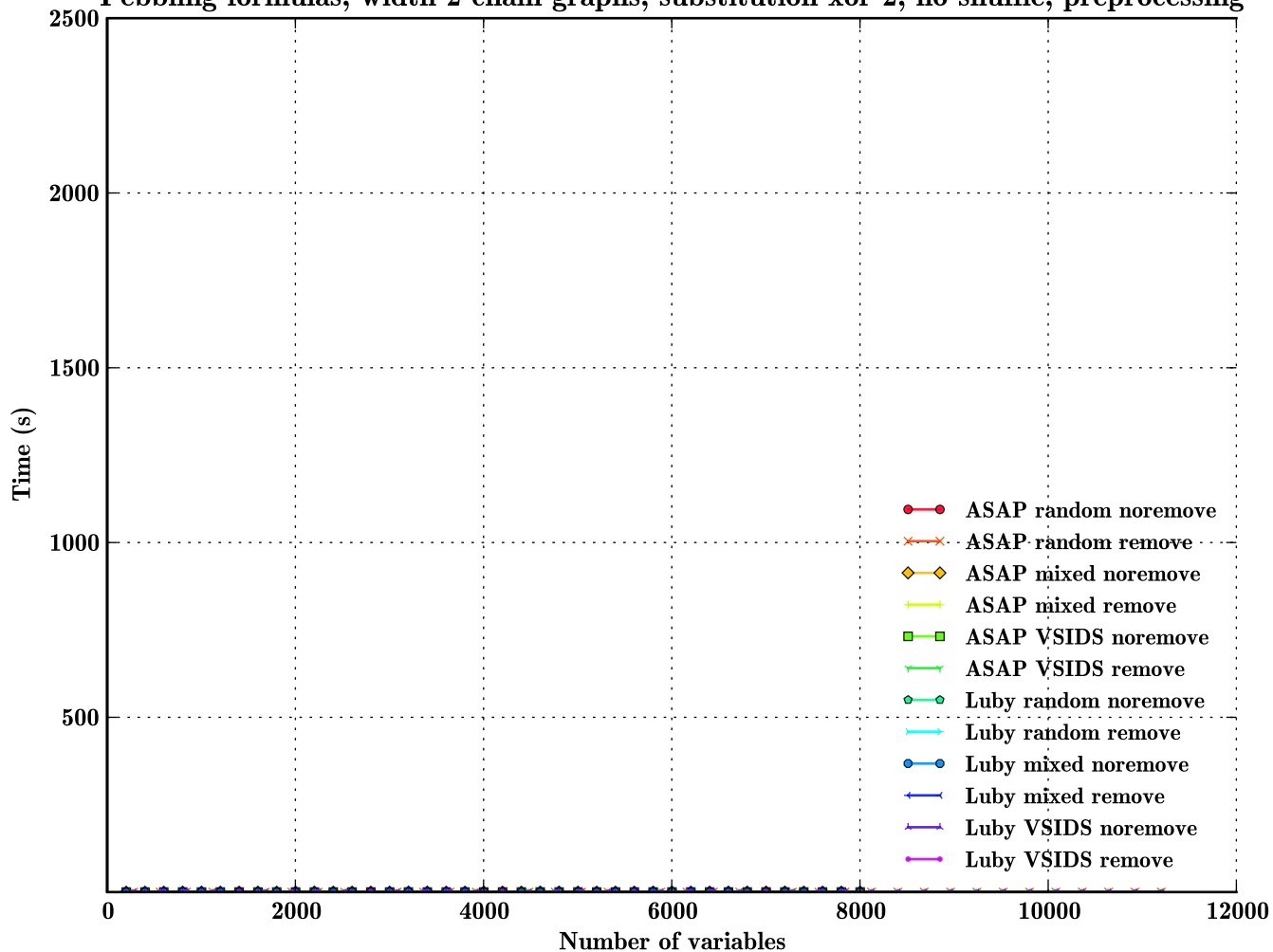
Pebbling formulas, width 2 chain graphs, substitution xor 2, no shuffle, no preprocessing



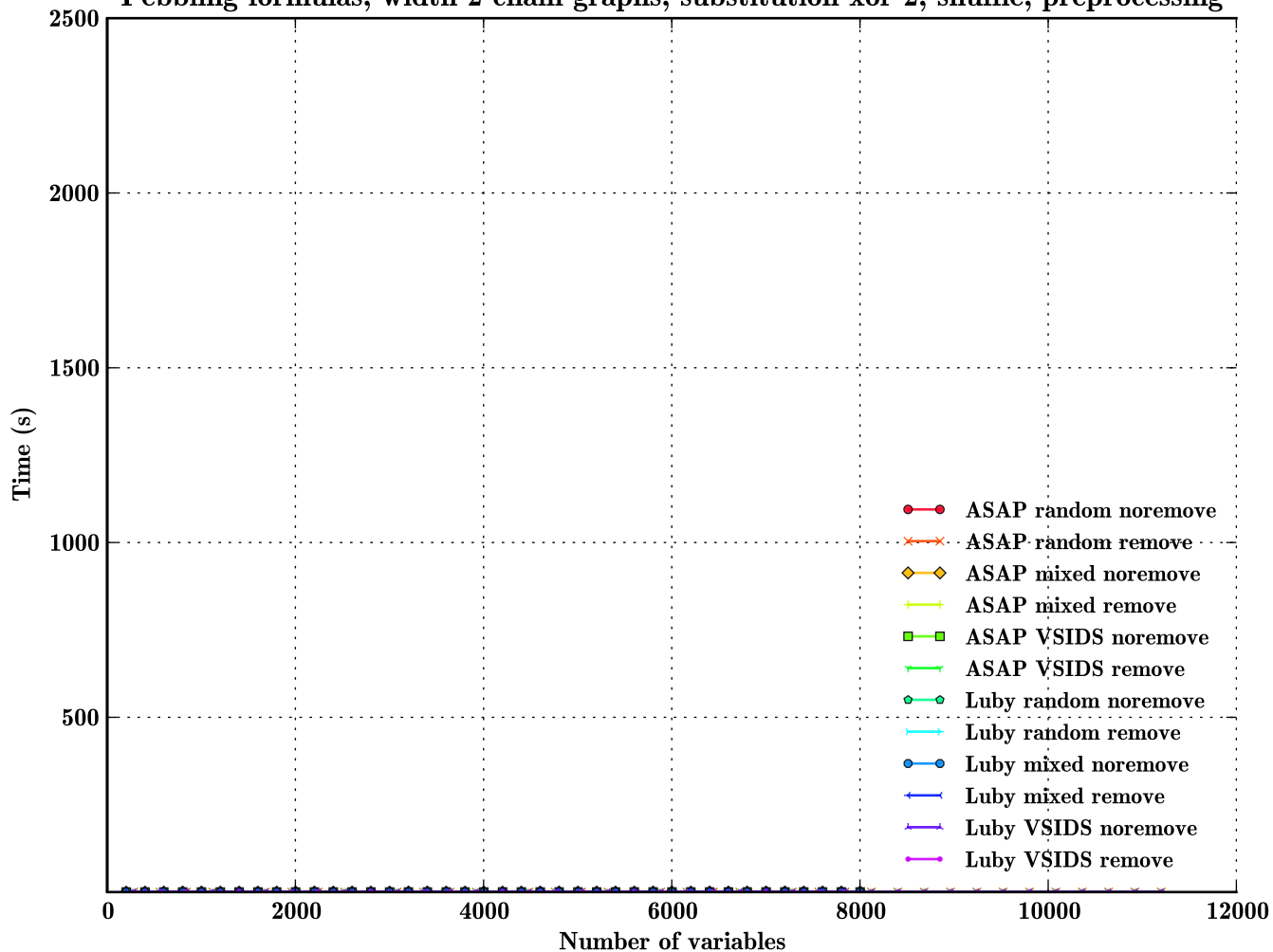
Pebbling formulas, width 2 chain graphs, substitution xor 2, shuffle, no preprocessing



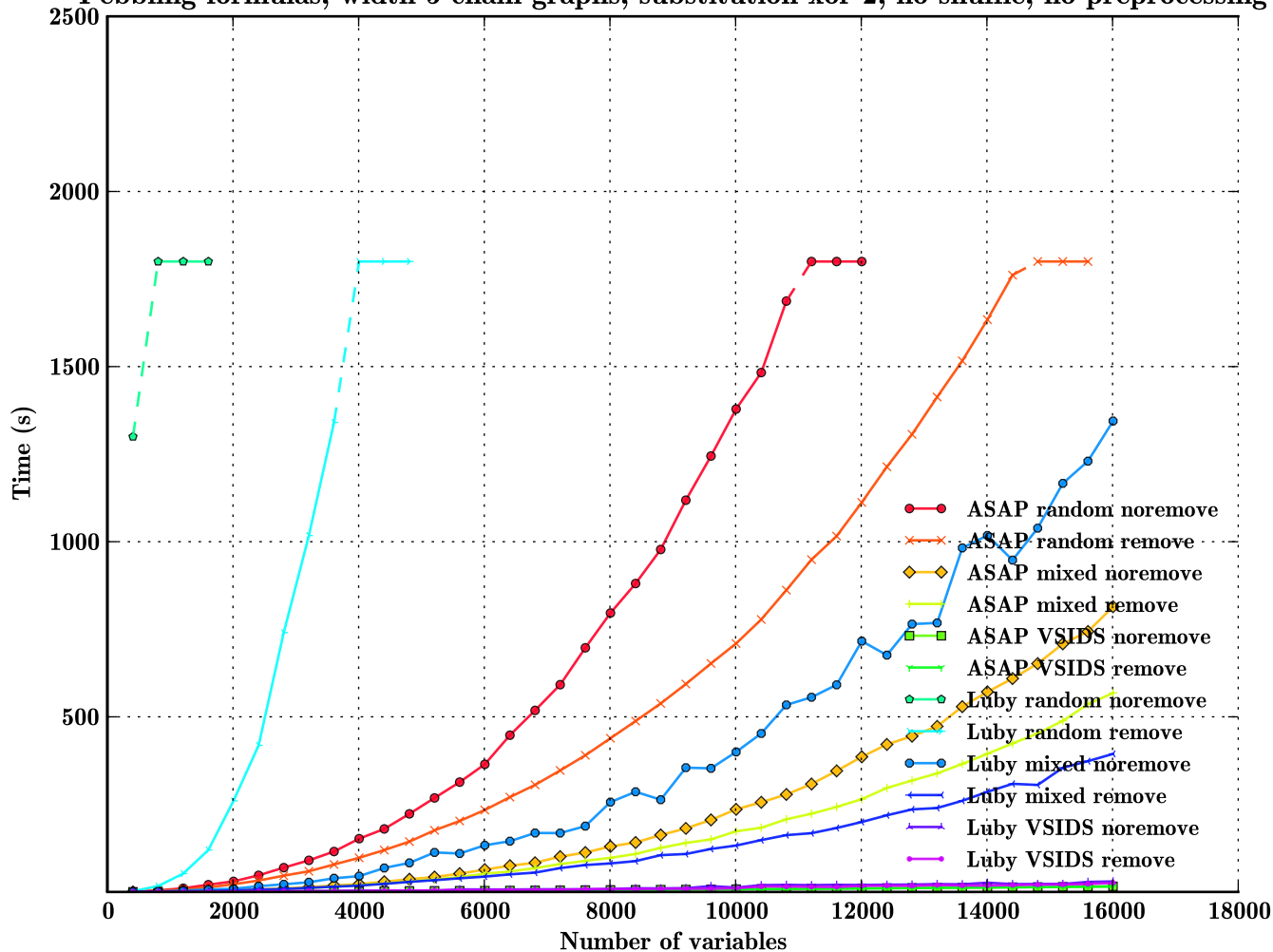
Pebbling formulas, width 2 chain graphs, substitution xor 2, no shuffle, preprocessing



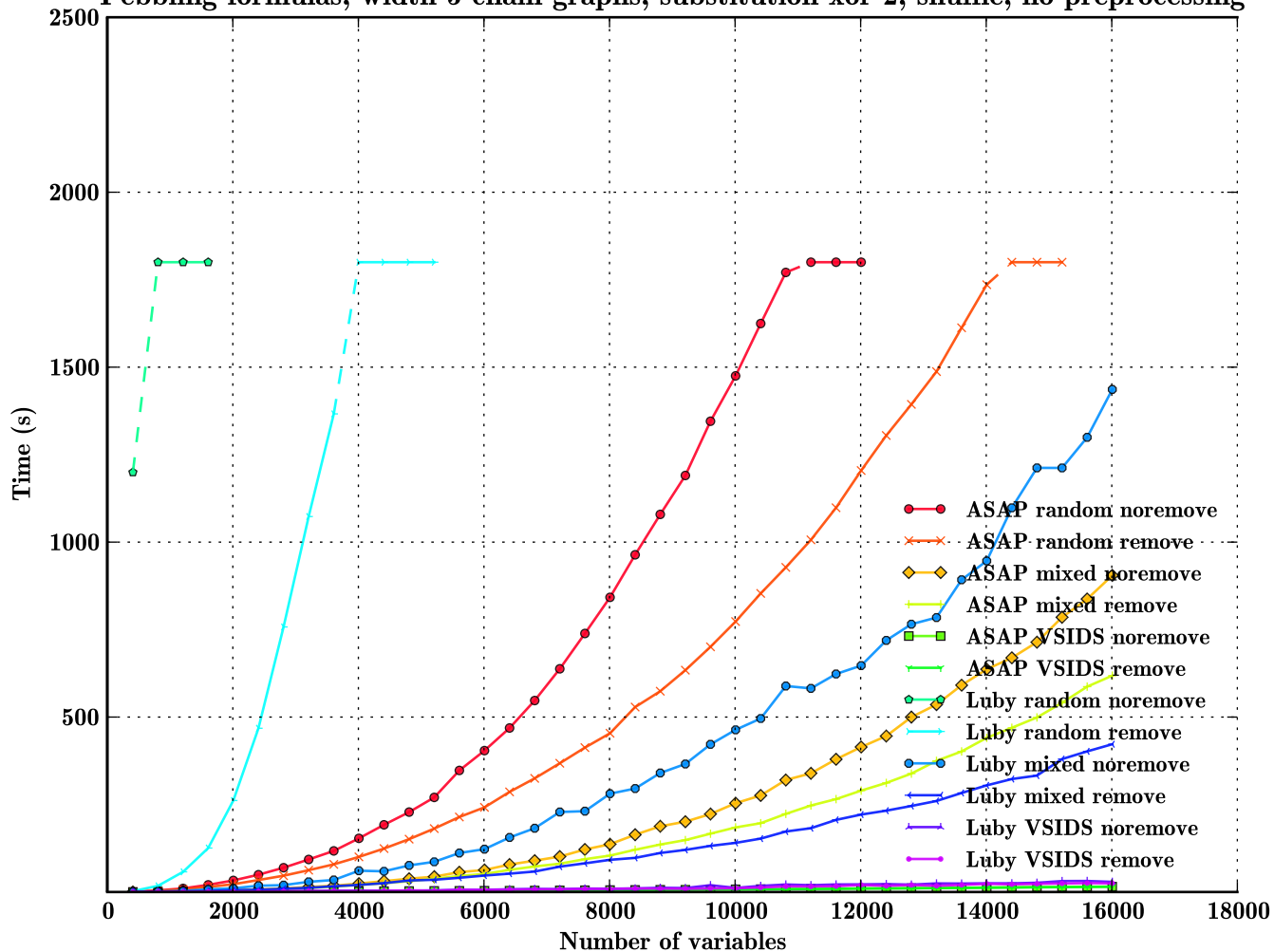
Pebbling formulas, width 2 chain graphs, substitution xor 2, shuffle, preprocessing



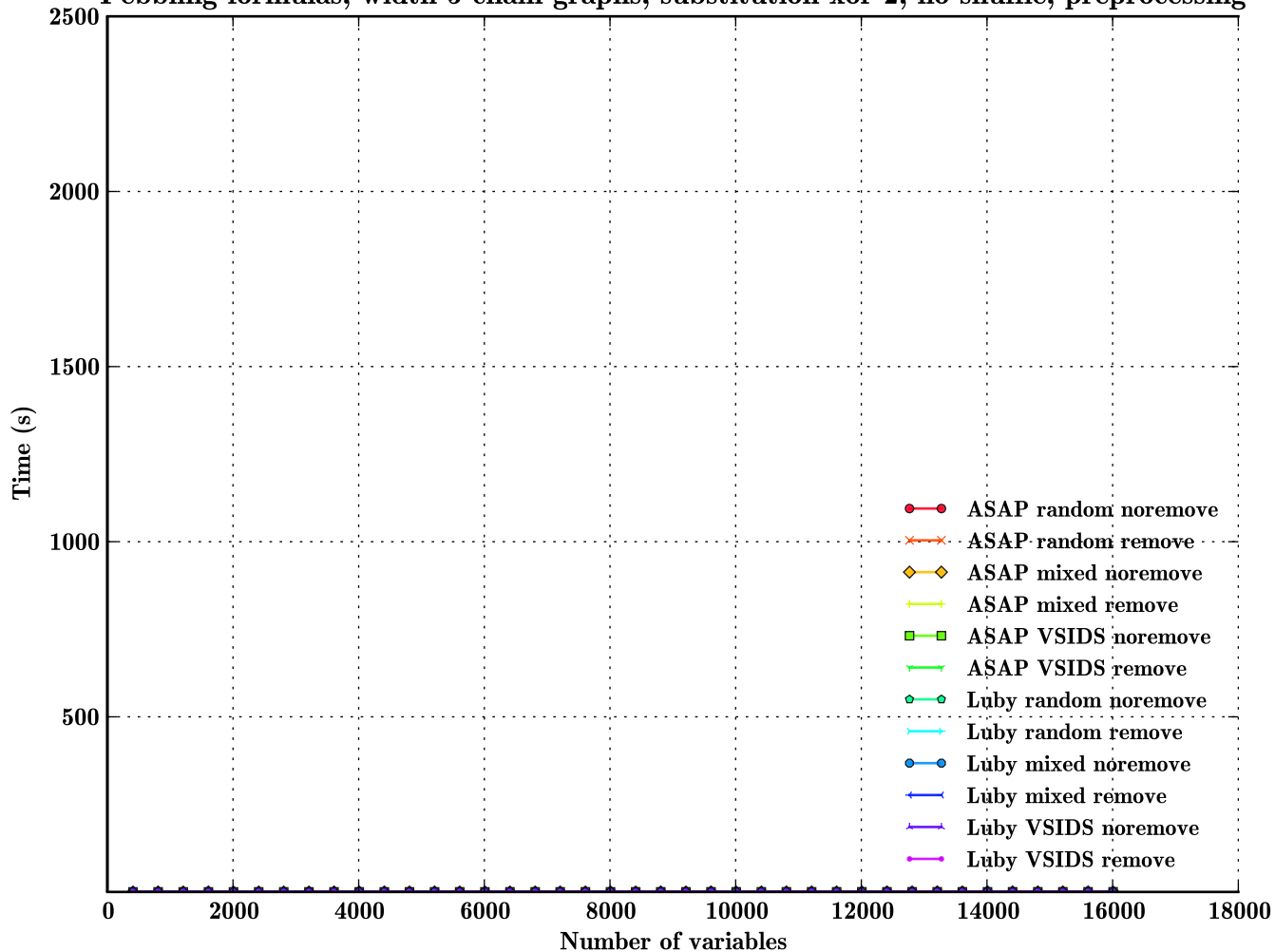
Pebbling formulas, width 5 chain graphs, substitution xor 2, no shuffle, no preprocessing



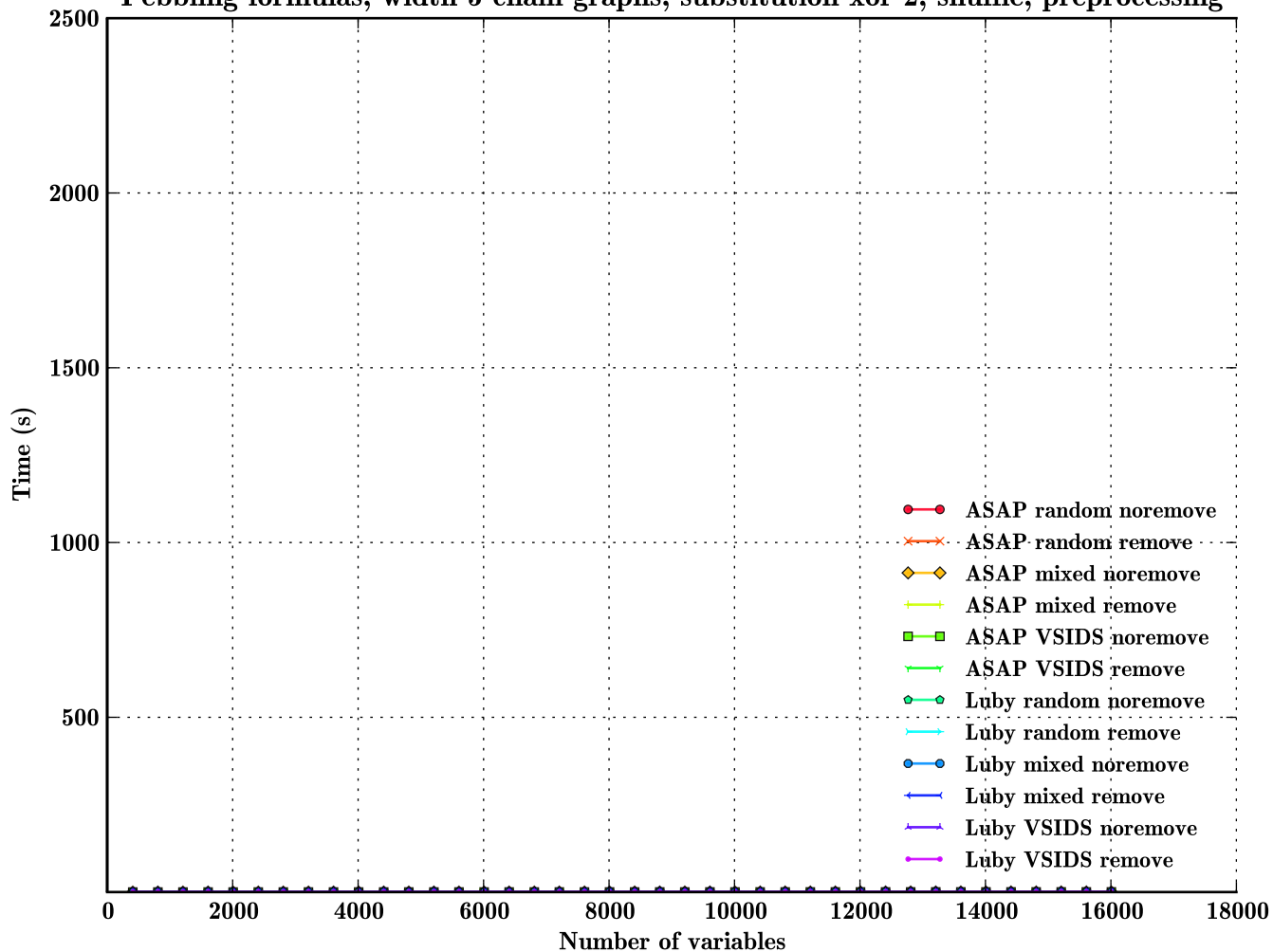
Pebbling formulas, width 5 chain graphs, substitution xor 2, shuffle, no preprocessing



Pebbling formulas, width 5 chain graphs, substitution xor 2, no shuffle, preprocessing

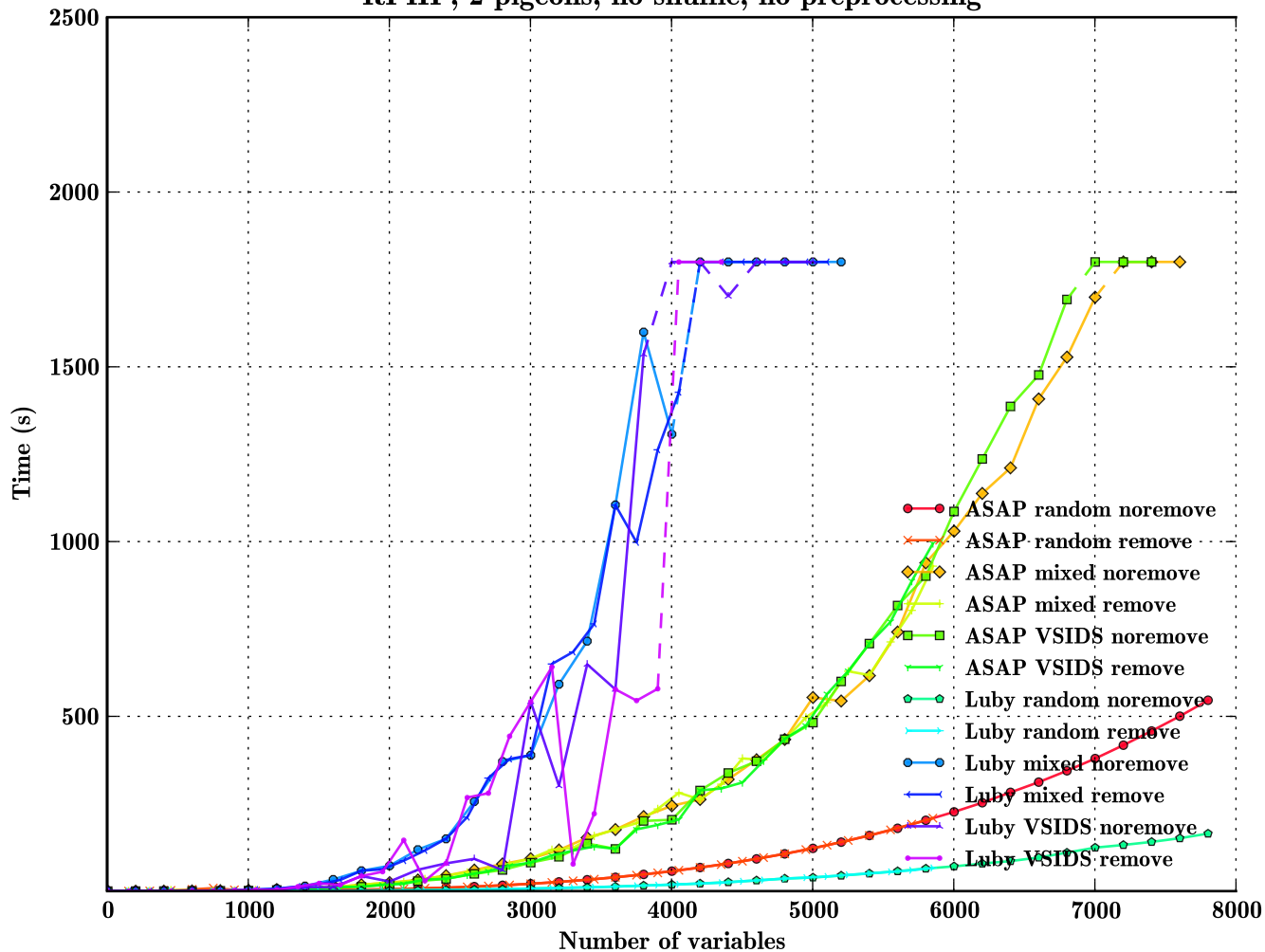


Pebbling formulas, width 5 chain graphs, substitution xor 2, shuffle, preprocessing

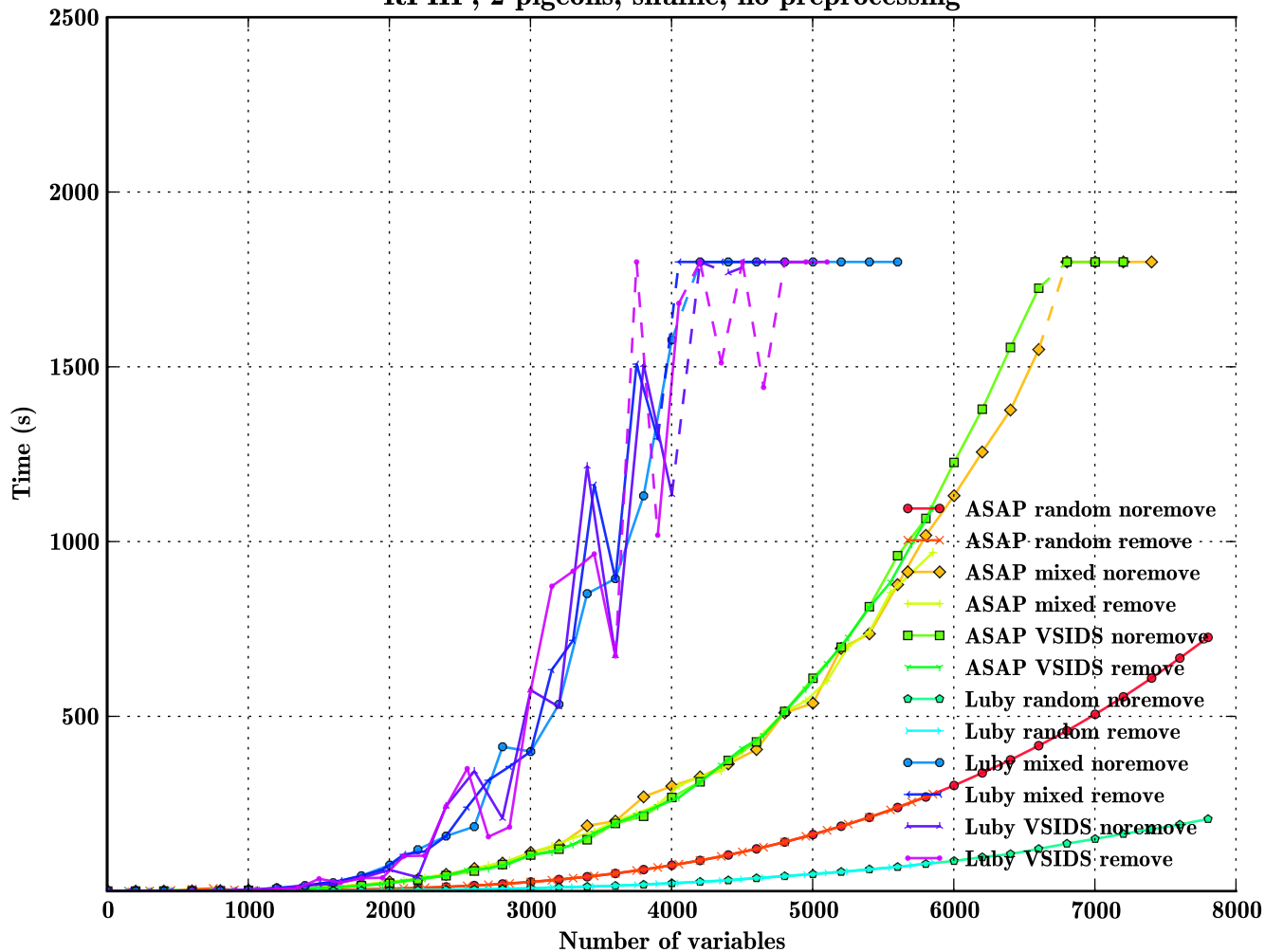


Relativized pigeonhole principle formulas (RPHP)

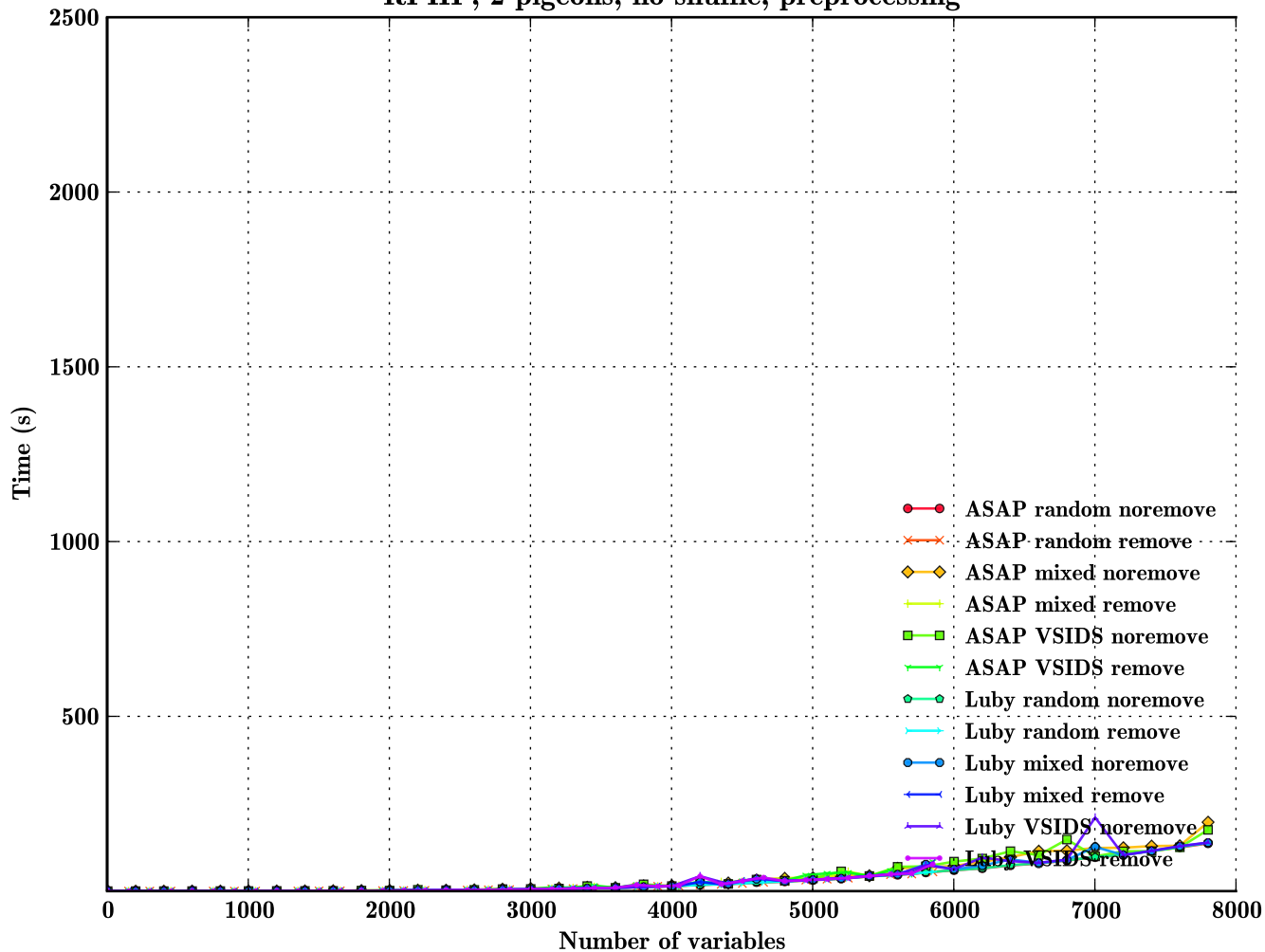
RPHP, 2 pigeons, no shuffle, no preprocessing



RPHP, 2 pigeons, shuffle, no preprocessing



RPHP, 2 pigeons, no shuffle, preprocessing



RPHP, 2 pigeons, shuffle, preprocessing

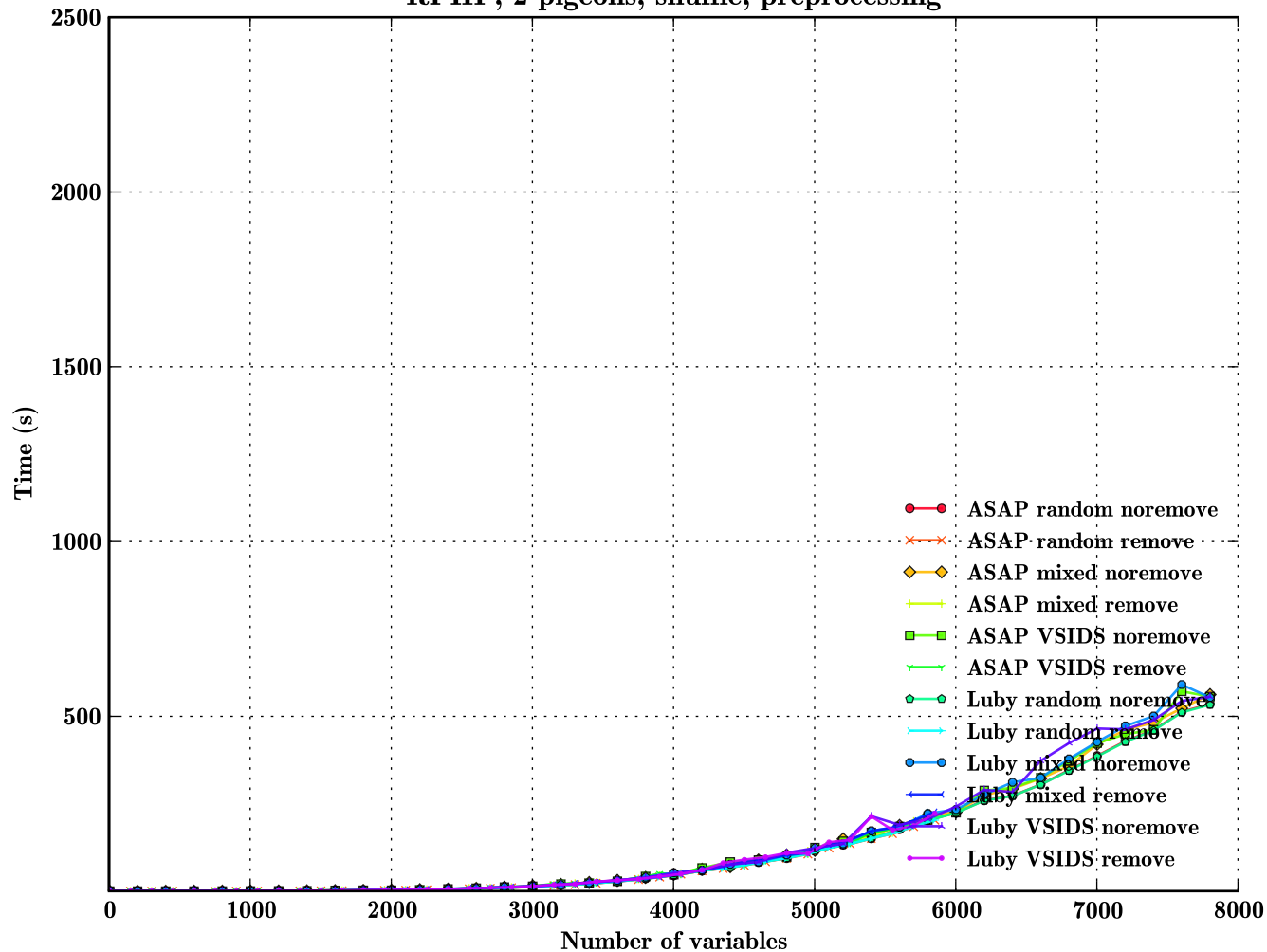
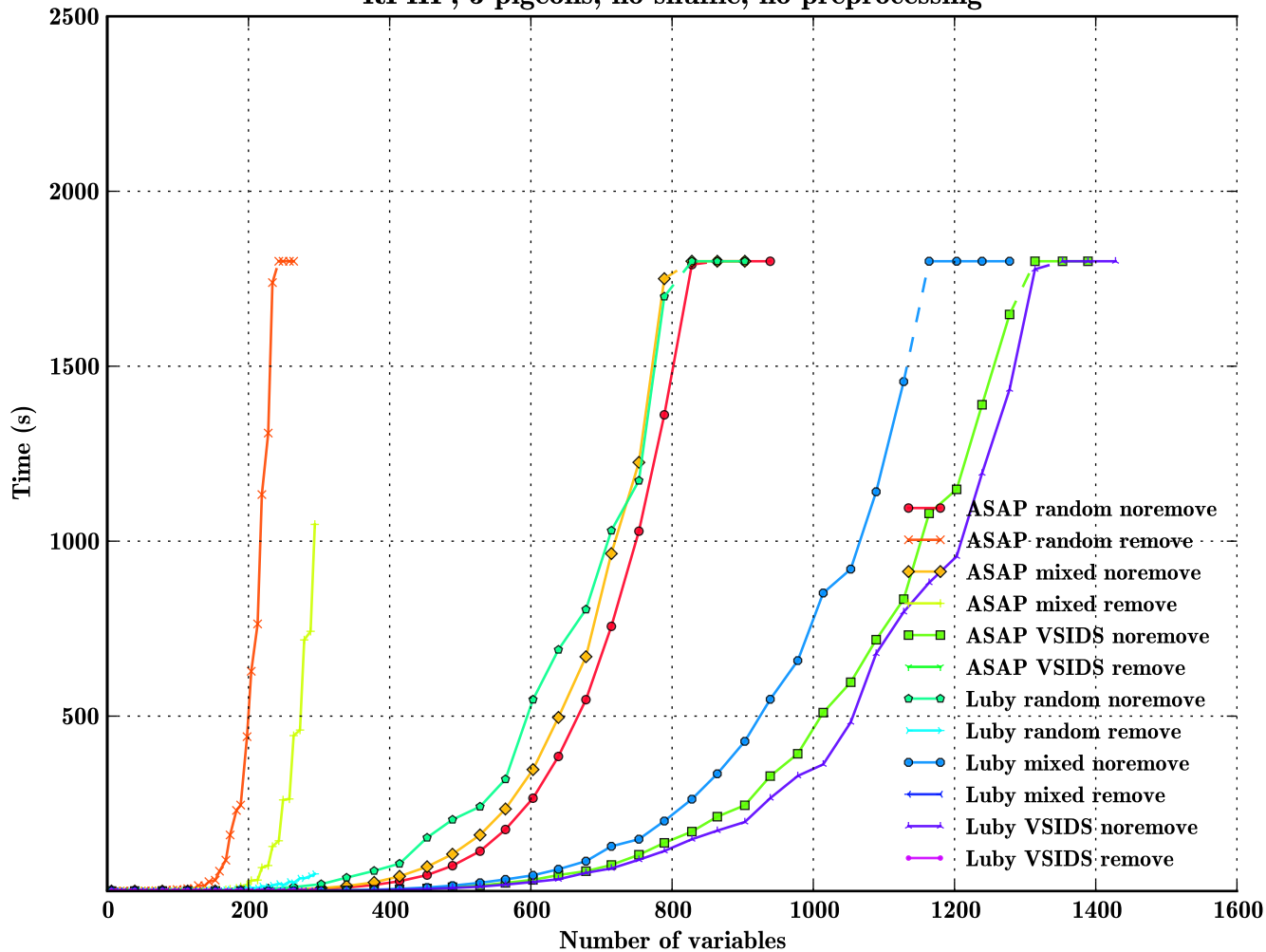
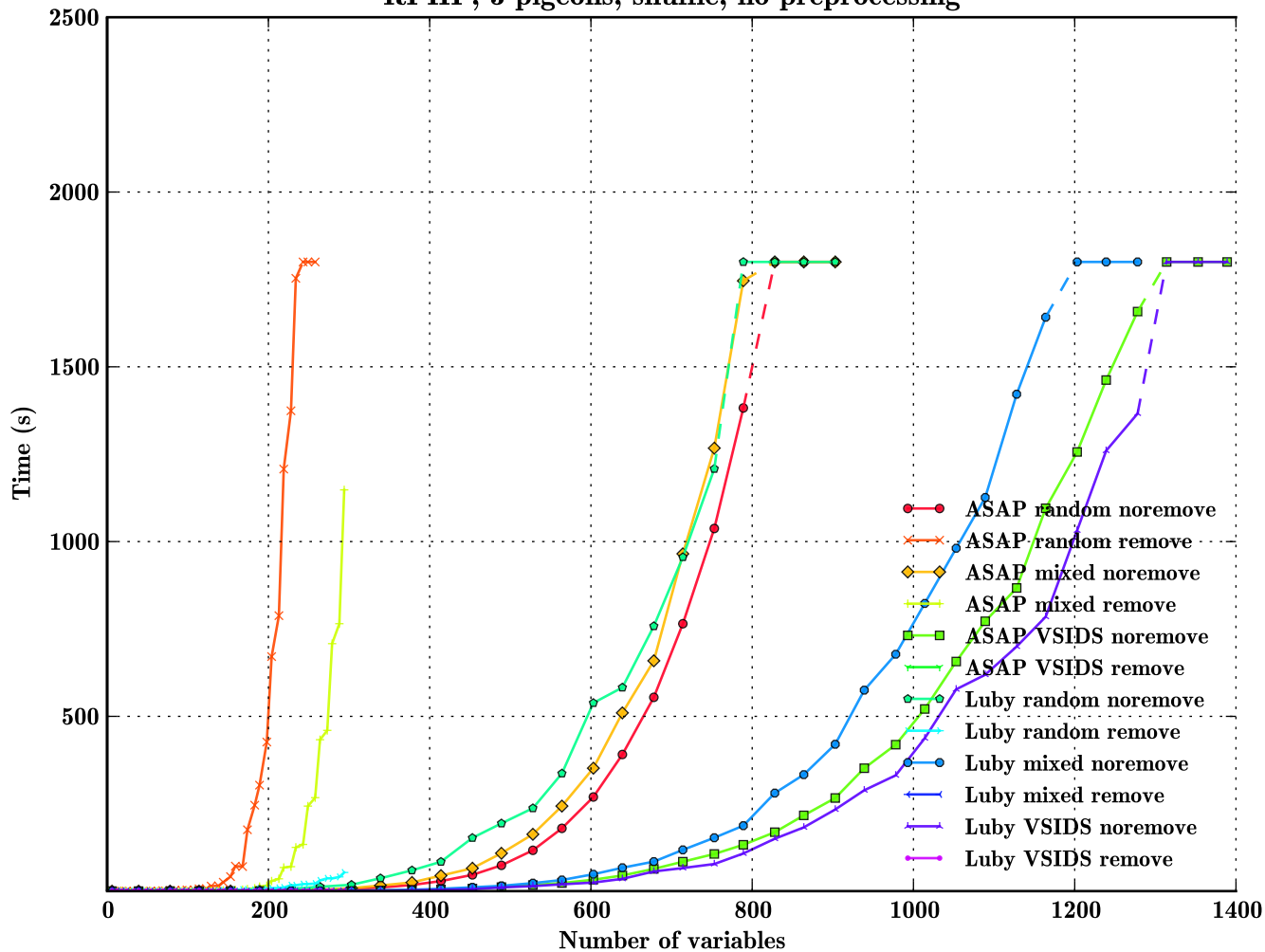


Figure 10 is a line graph showing the number of iterations required for convergence for various algorithms. The x-axis represents the number of iterations (0 to 1600), and the y-axis represents the number of iterations required for convergence (0 to 16). The graph compares 12 different algorithms, categorized by 'remove' and 'noremove' versions for ASAP, Luby, and VSIDS methods. The 'remove' versions generally converge faster than the 'noremove' versions. ASAP random remove converges almost immediately, while Luby VSIDS remove converges around 1300 iterations.

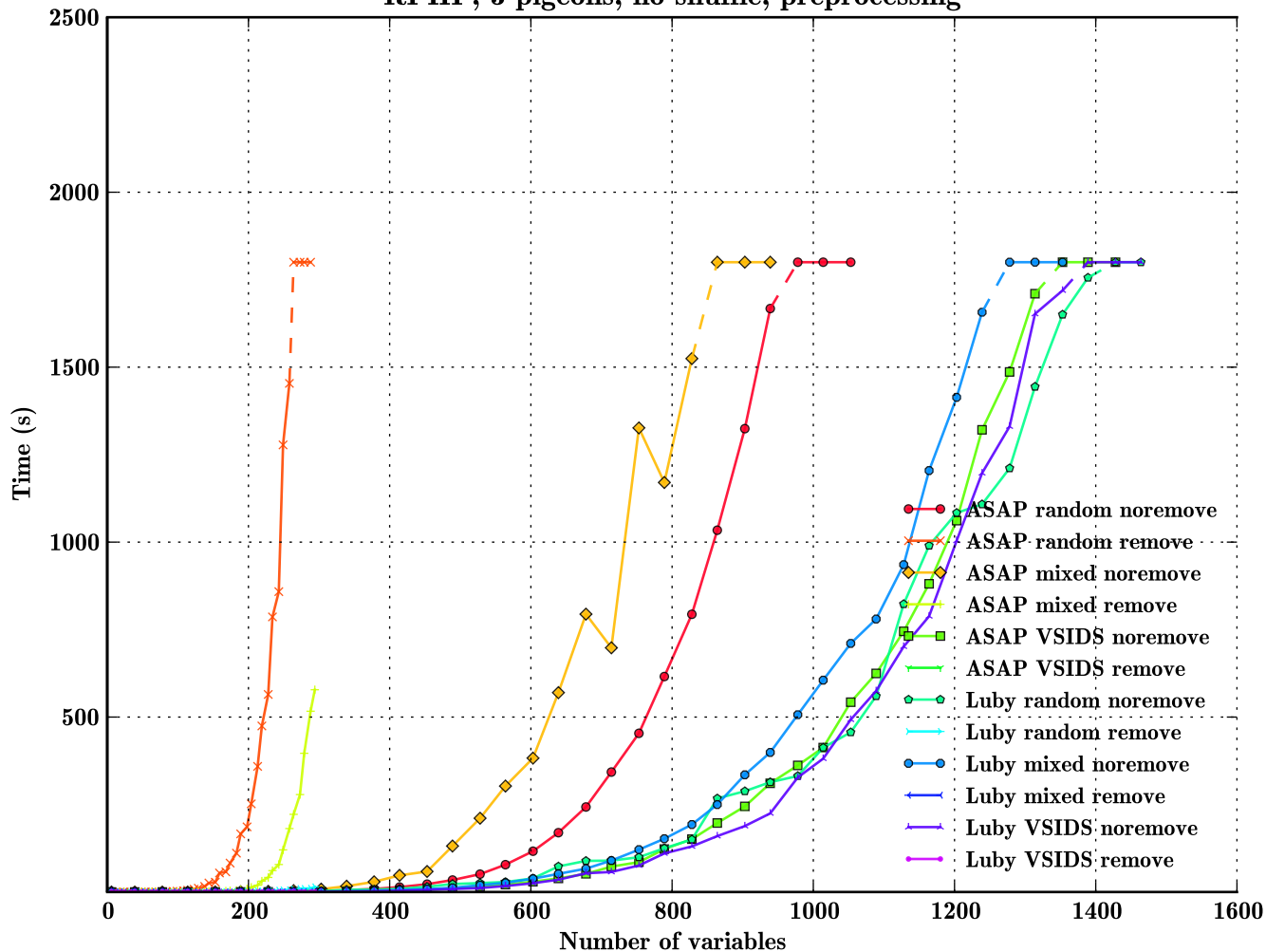
Algorithm	Approximate Iterations for Convergence
ASAP random noremove	~950
ASAP random remove	~200
ASAP mixed noremove	~800
ASAP mixed remove	~300
ASAP VSIDS noremove	~1250
ASAP VSIDS remove	~1100
Luby random noremove	~850
Luby random remove	~400
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Luby VSIDS noremove	~1400
Luby VSIDS remove	~1300



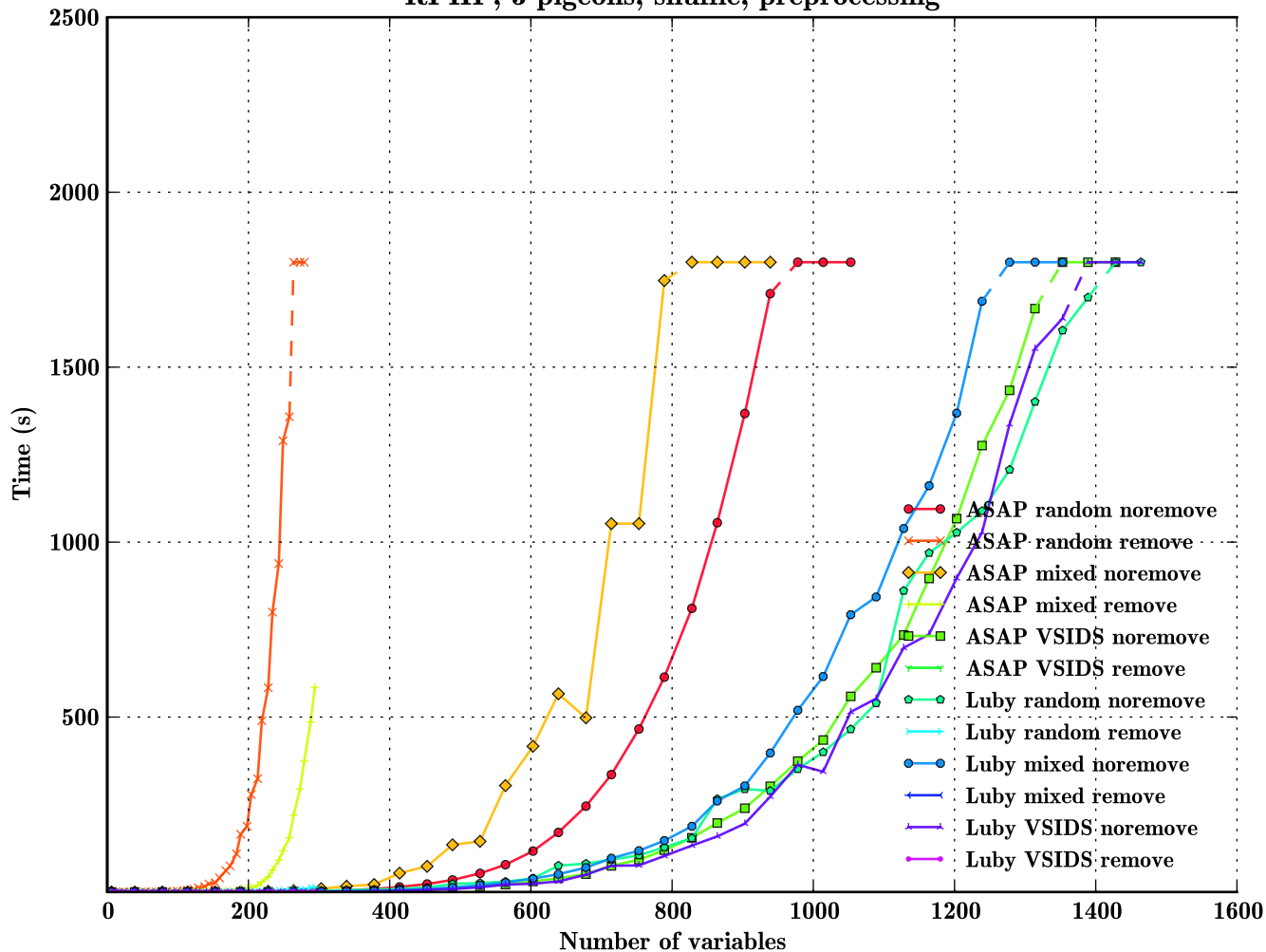
RPHP, 3 pigeons, shuffle, no preprocessing



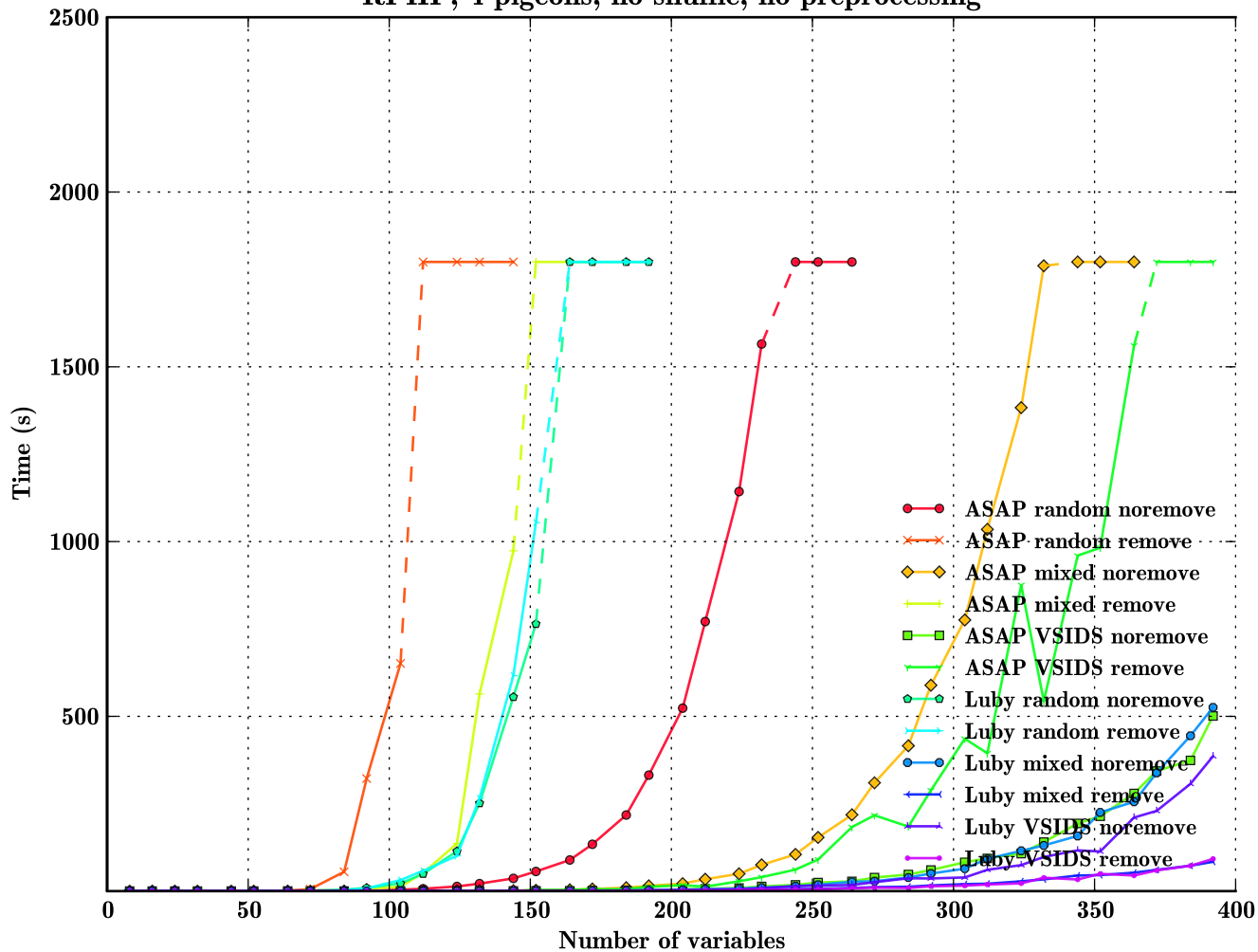
RPHP, 3 pigeons, no shuffle, preprocessing



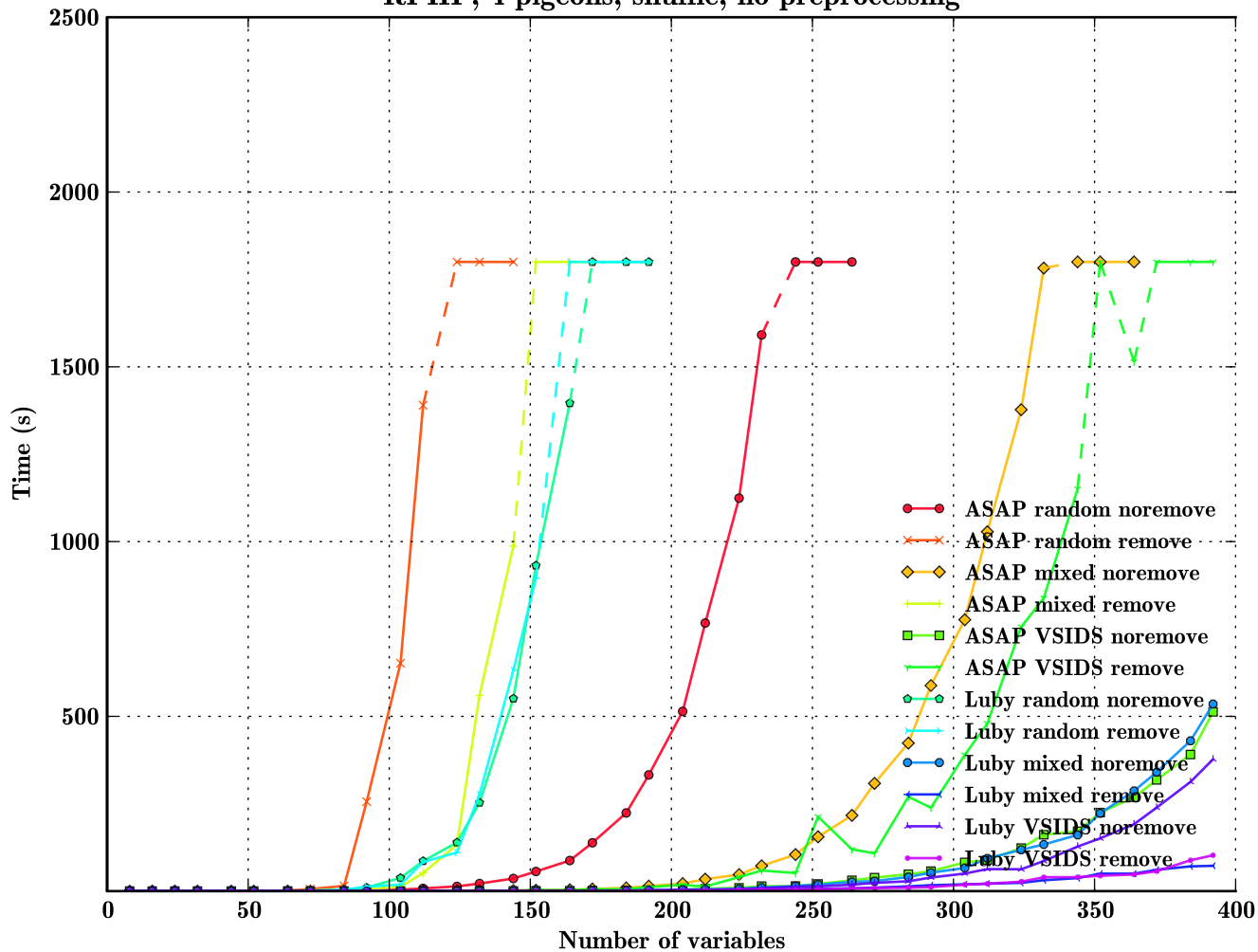
RPHP, 3 pigeons, shuffle, preprocessing



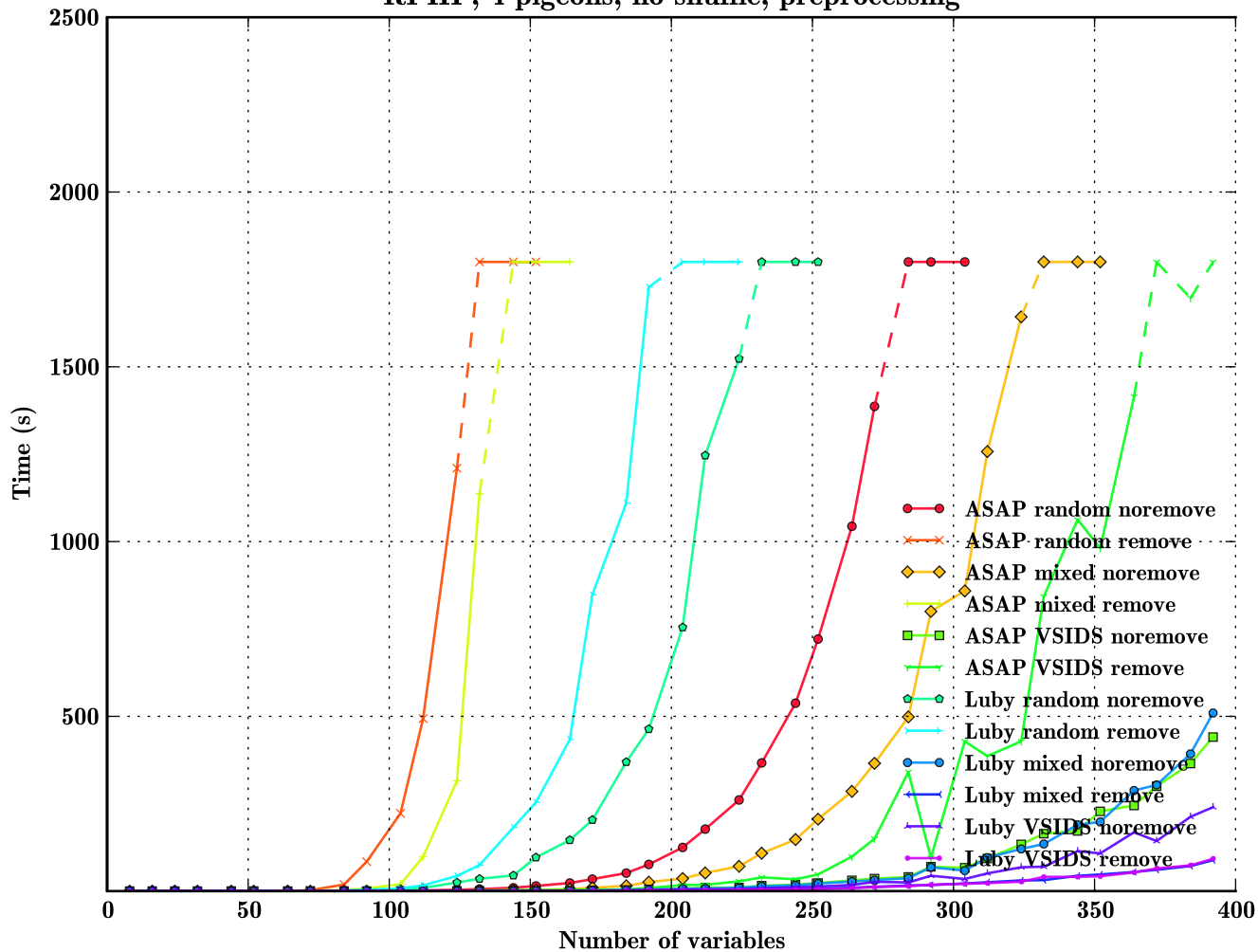
RPHP, 4 pigeons, no shuffle, no preprocessing



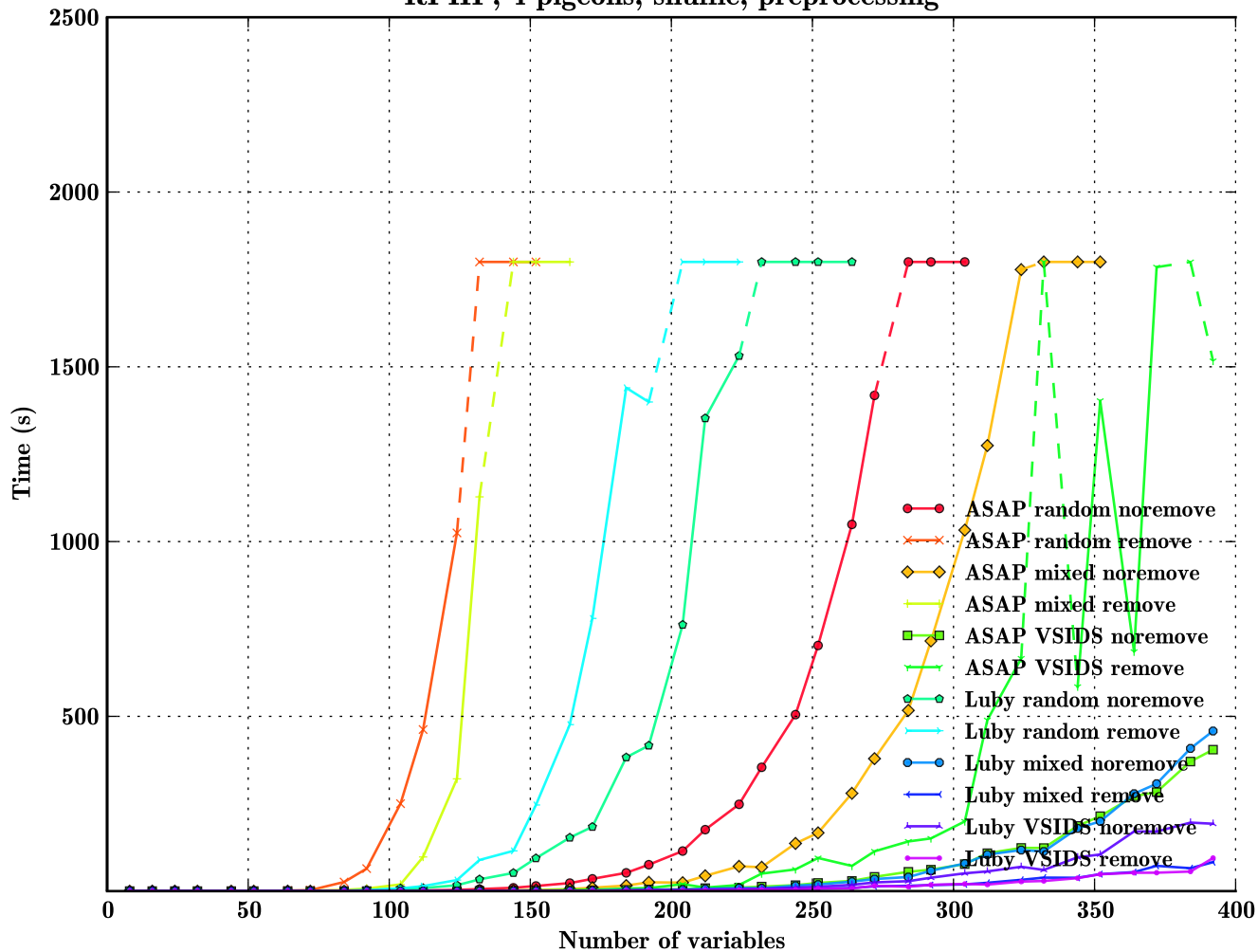
RPHP, 4 pigeons, shuffle, no preprocessing



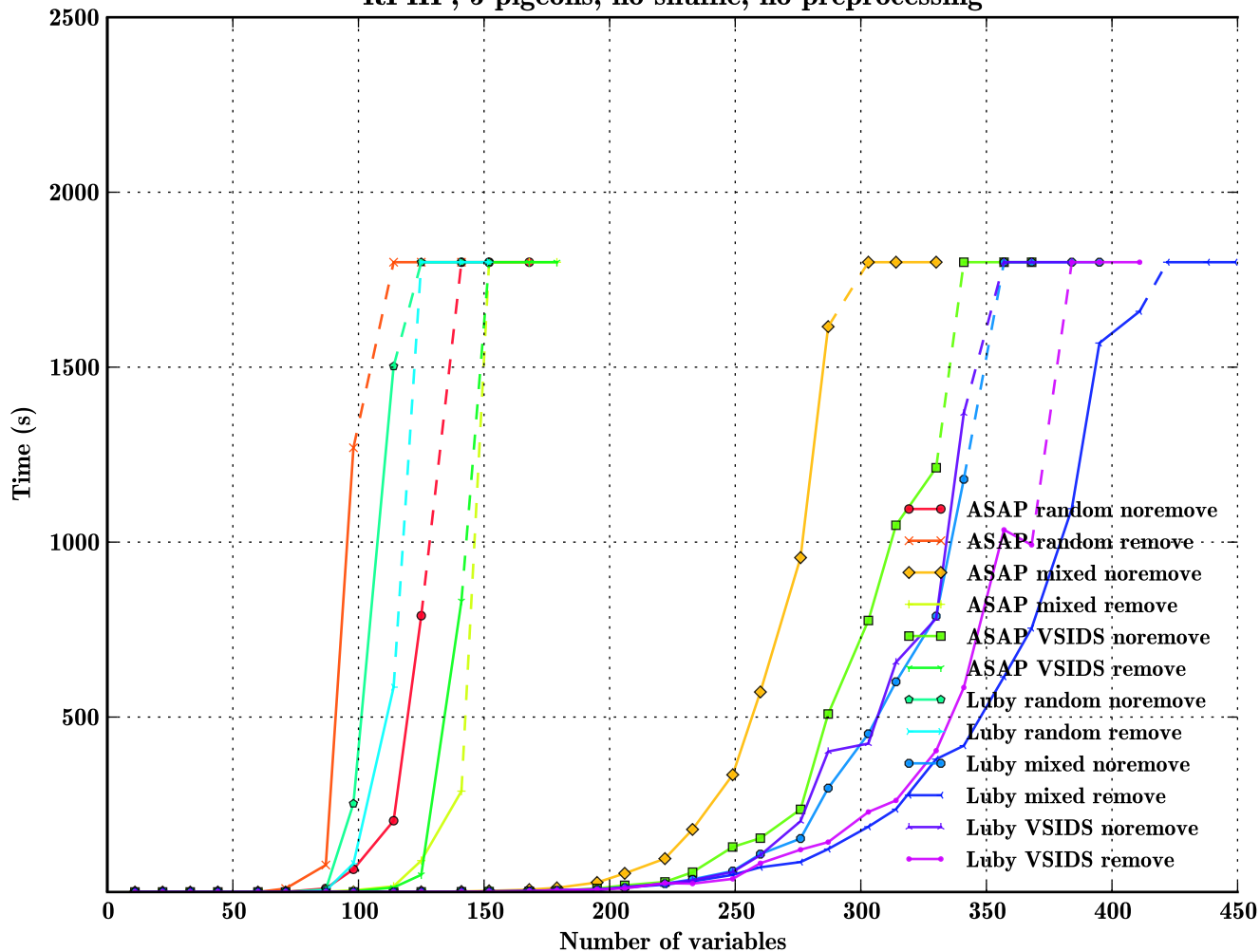
RPHP, 4 pigeons, no shuffle, preprocessing



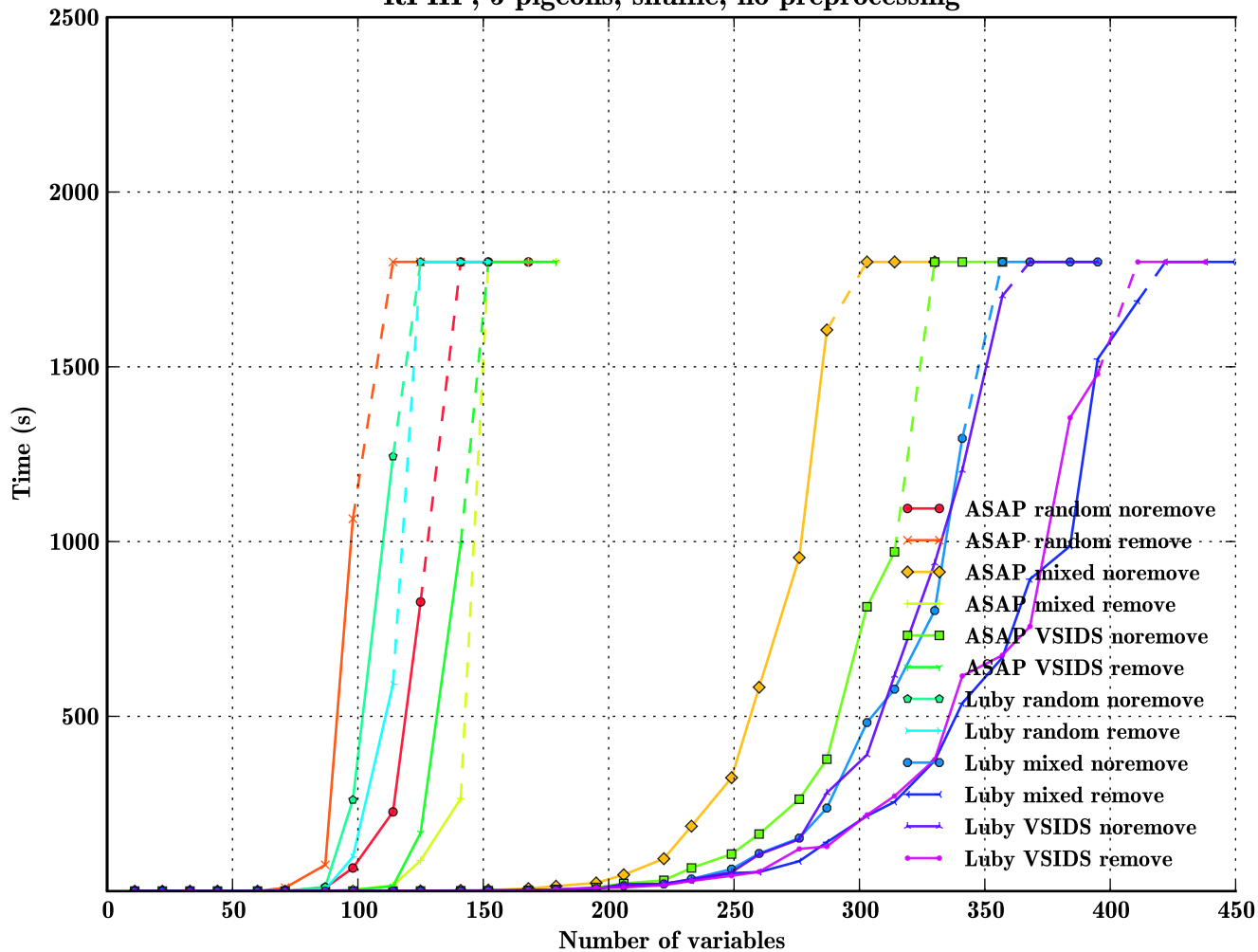
RPHP, 4 pigeons, shuffle, preprocessing



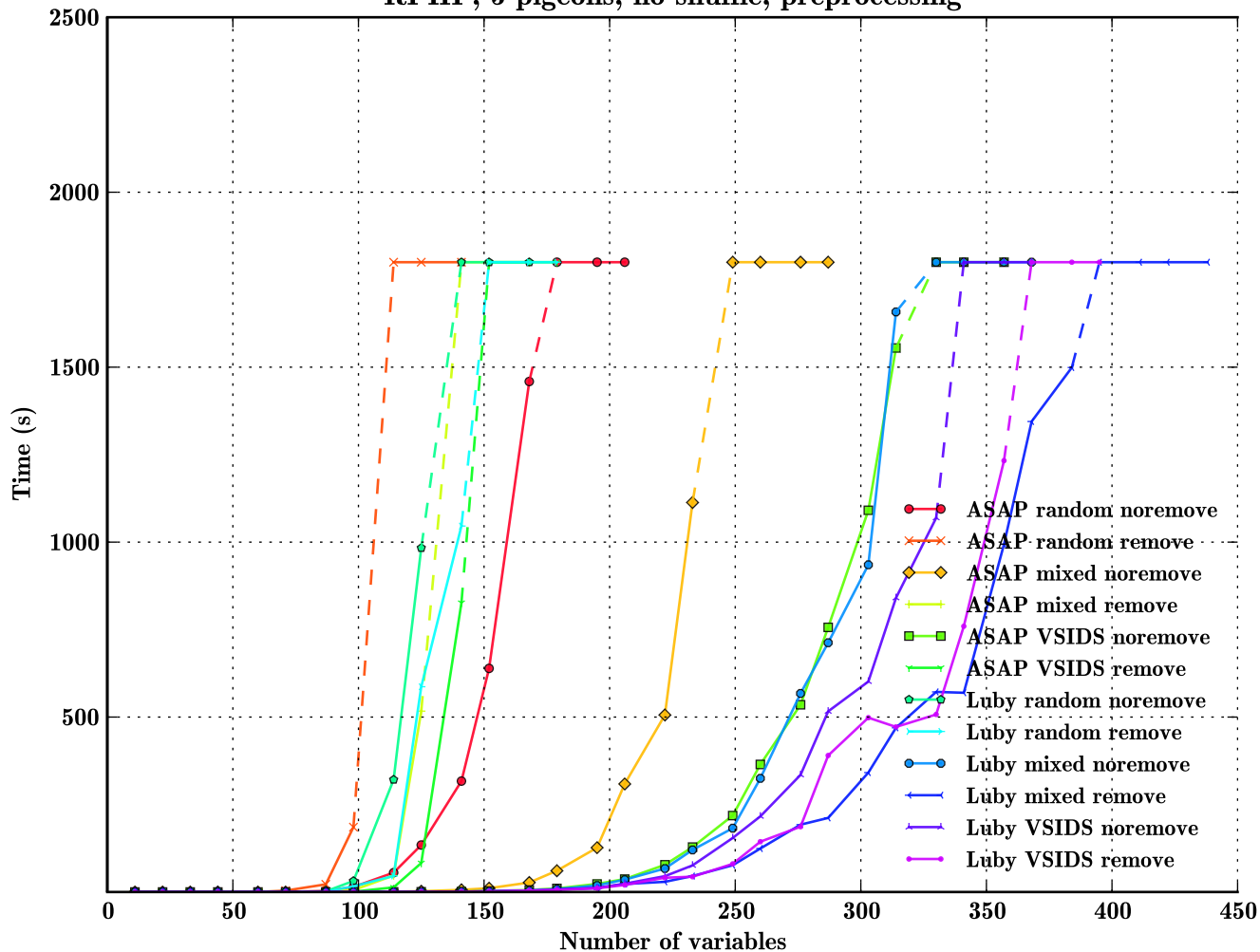
RPHP, 5 pigeons, no shuffle, no preprocessing



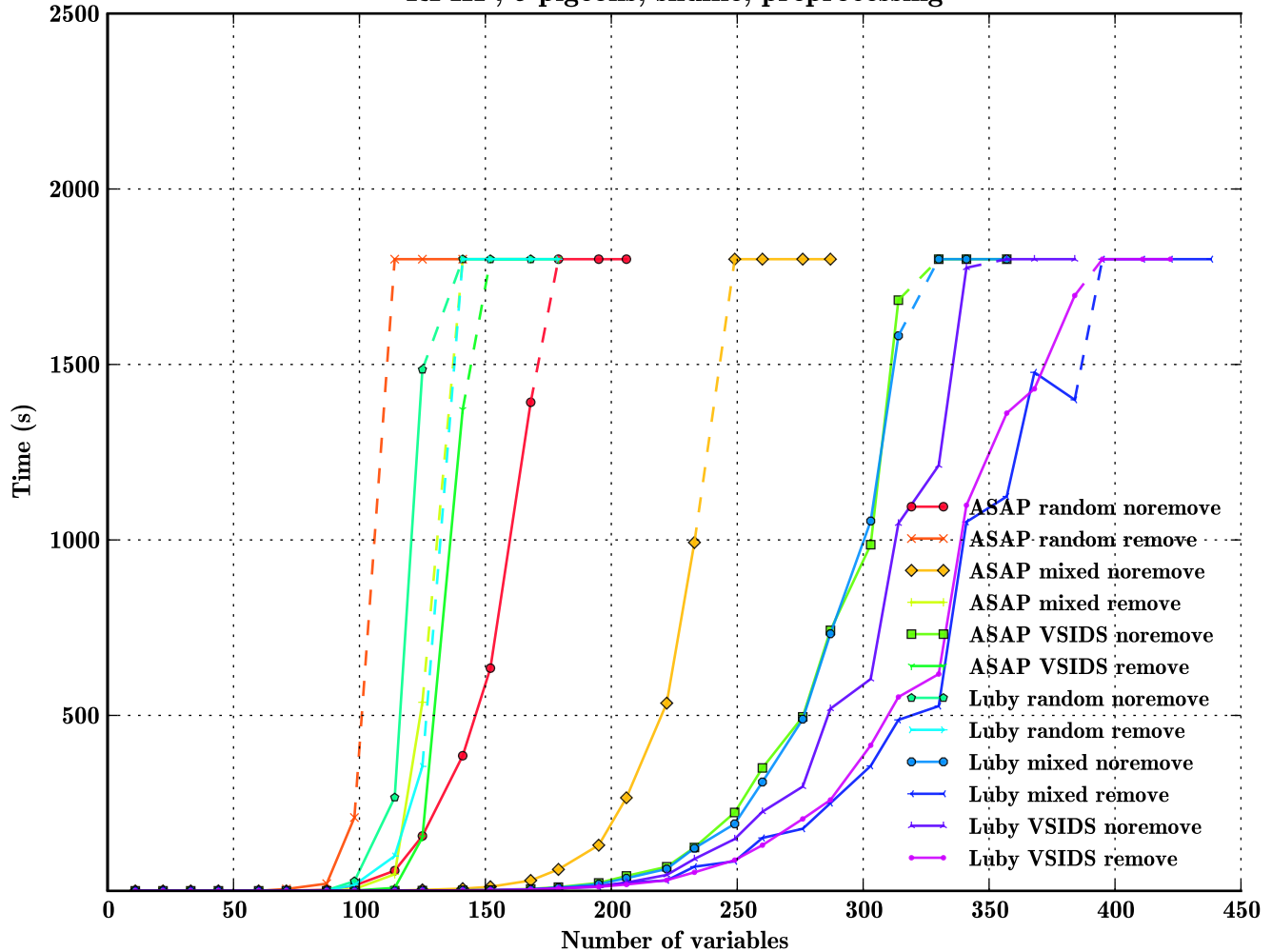
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RPHP, 5 pigeons, no shuffle, preprocessing

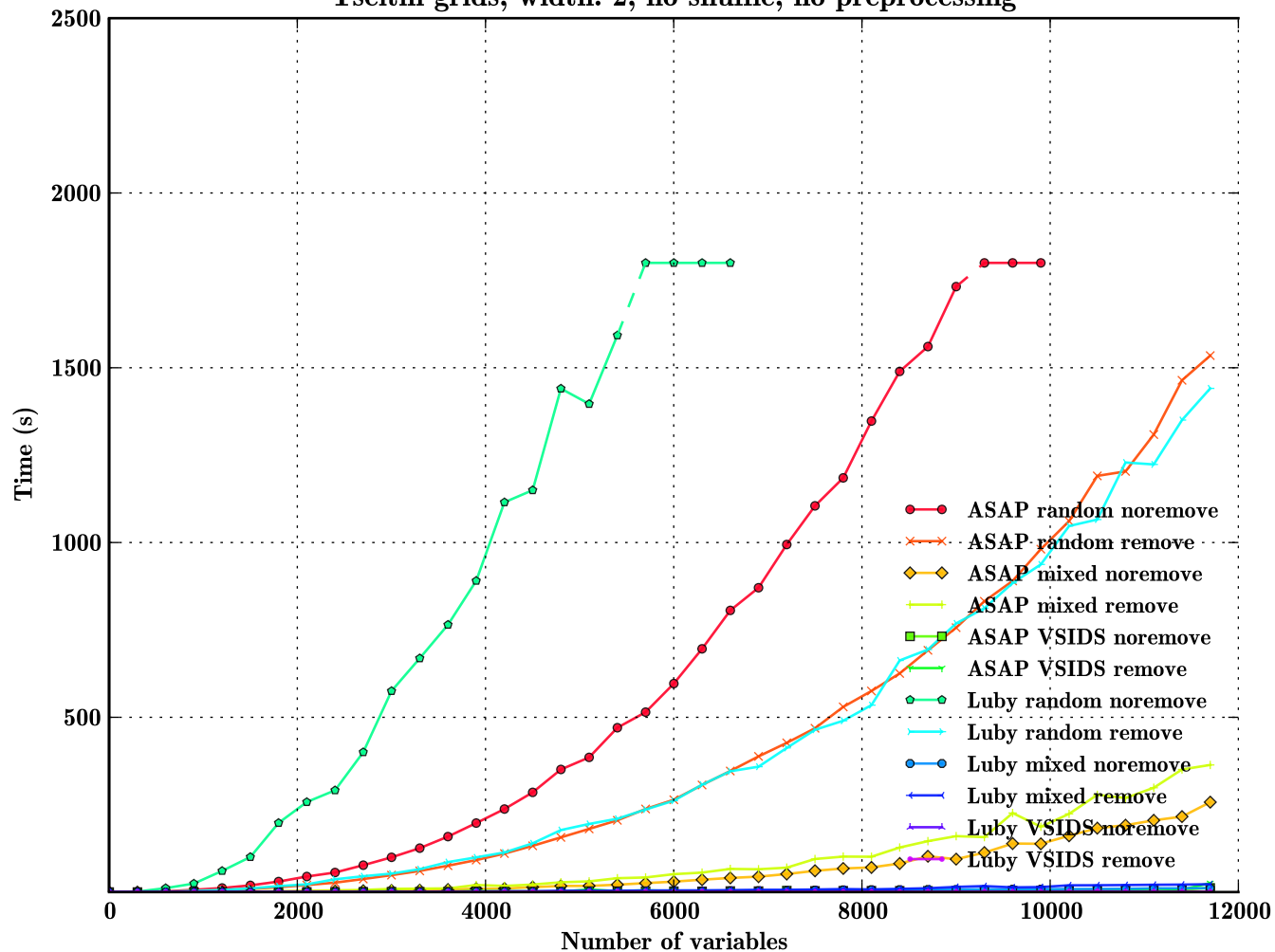


RPHP, 5 pigeons, shuffle, preprocessing

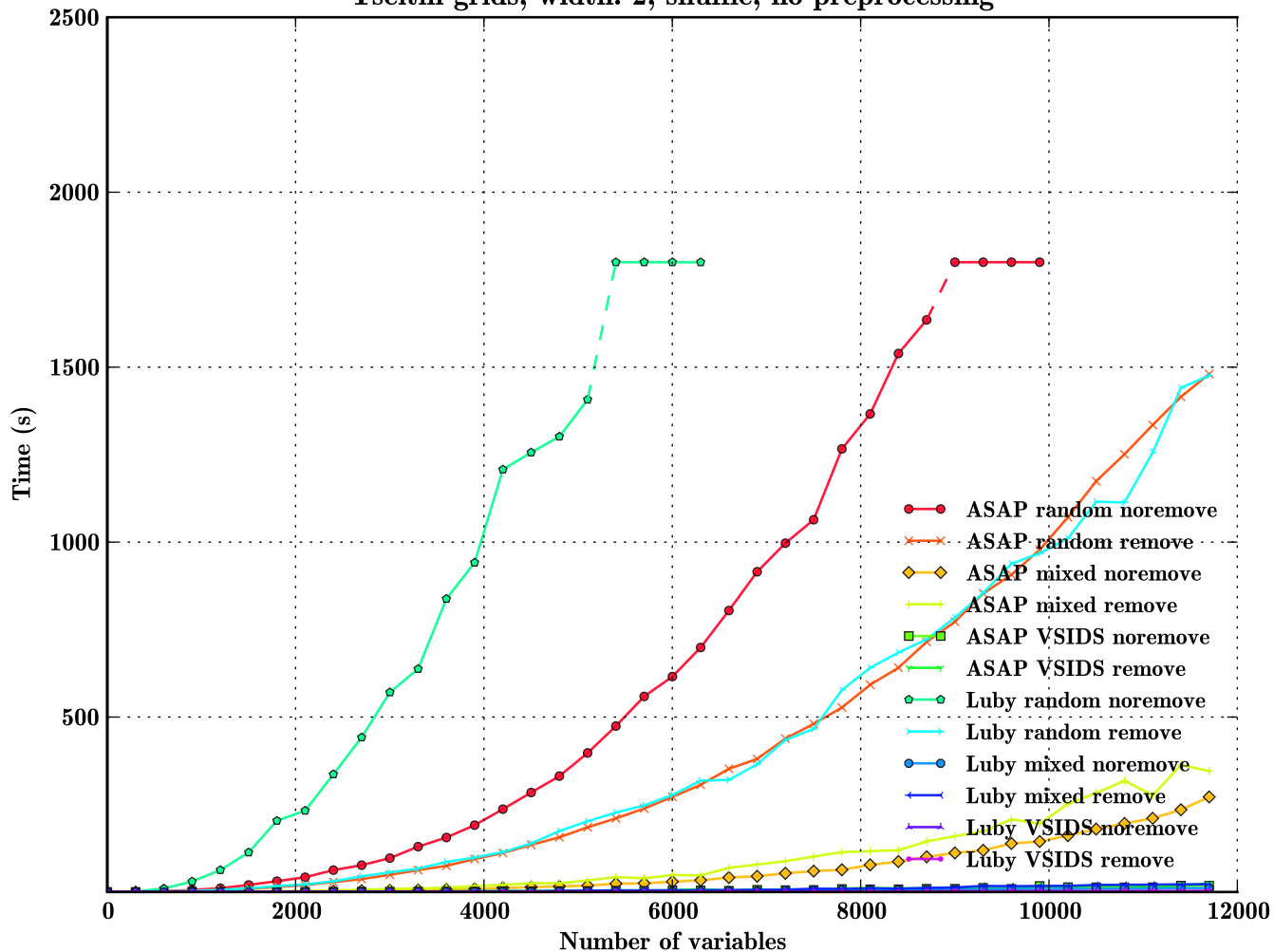


Tseitin grids

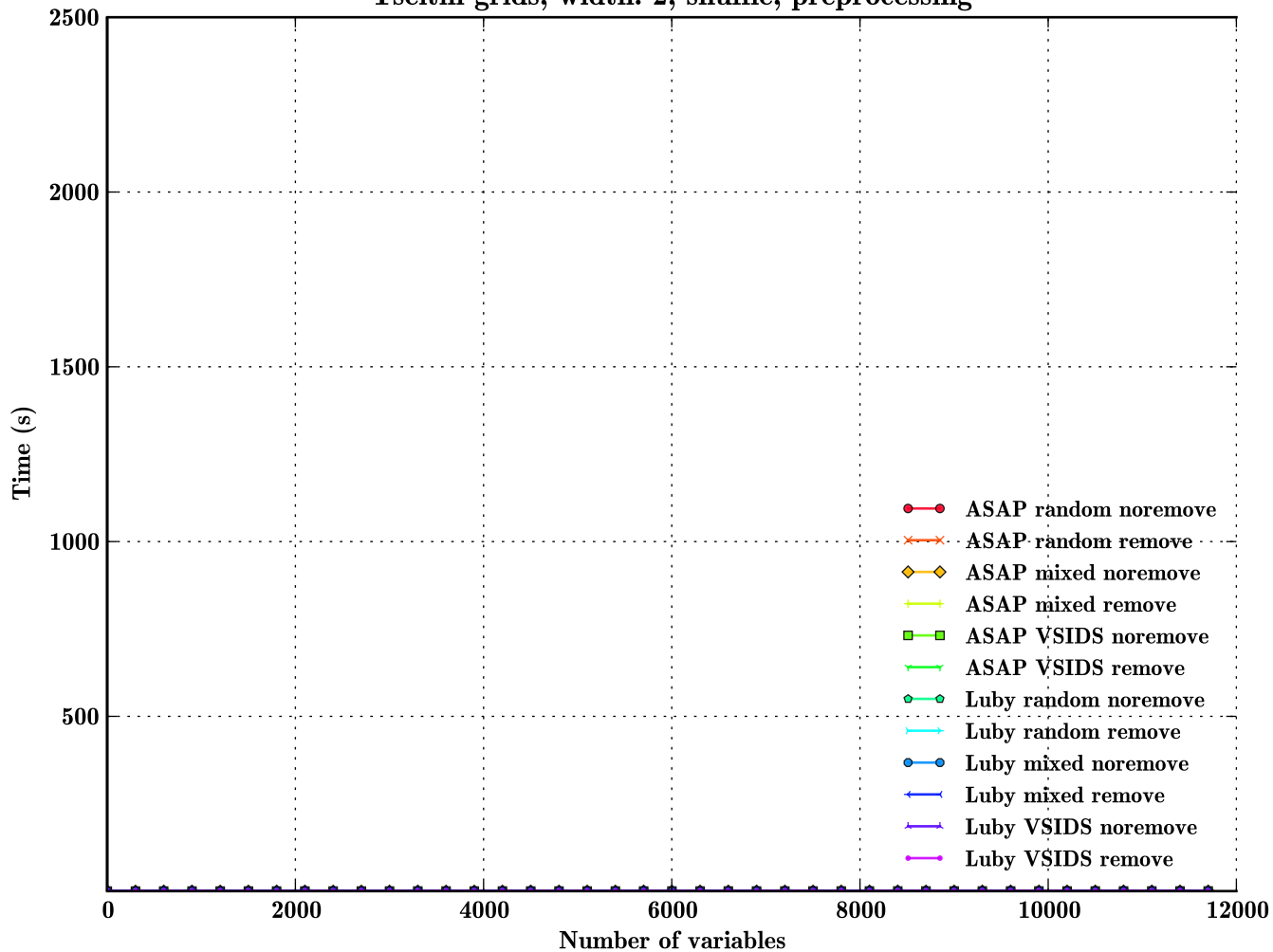
Tseitin grids, width: 2, no shuffle, no preprocessing



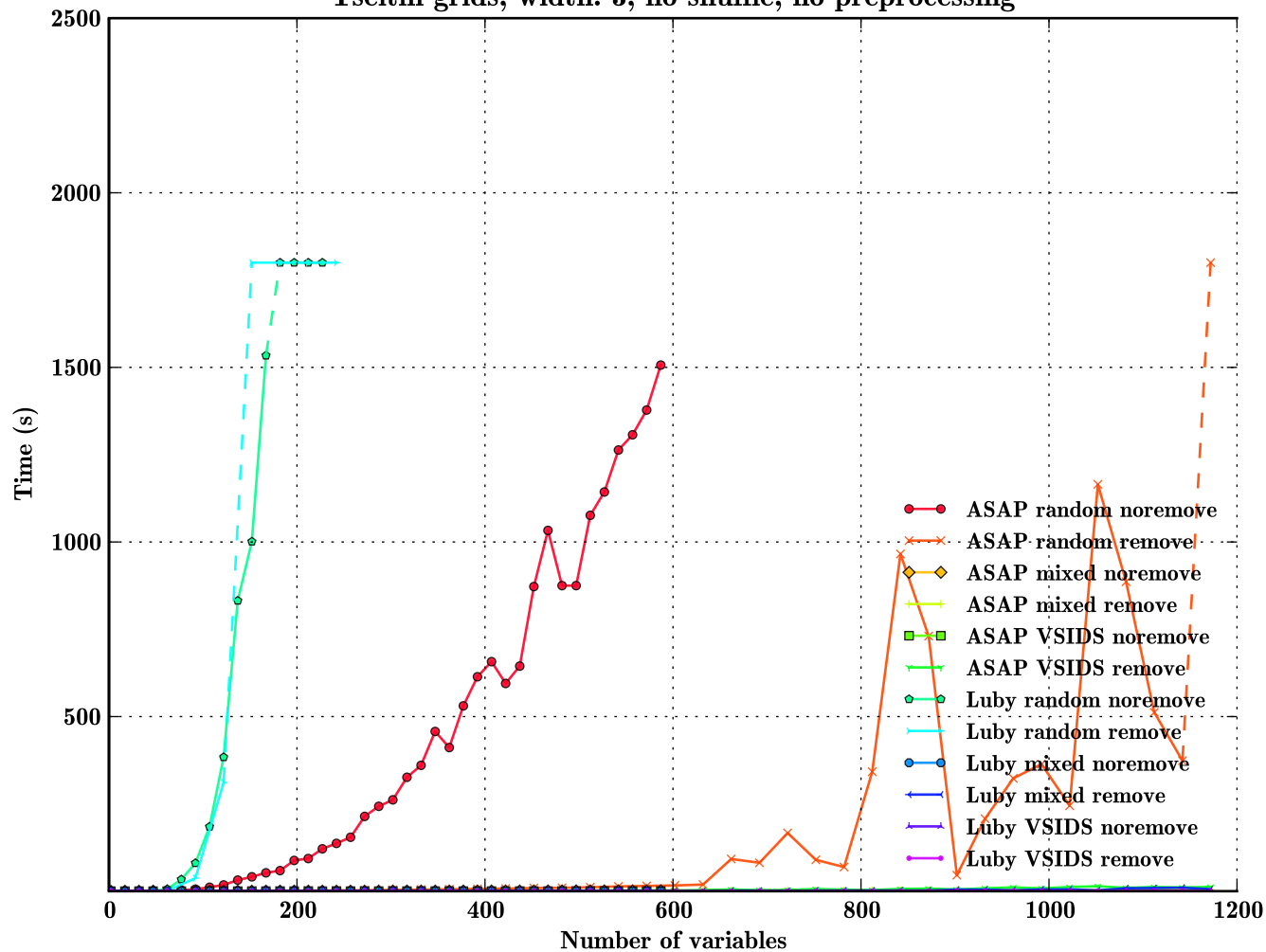
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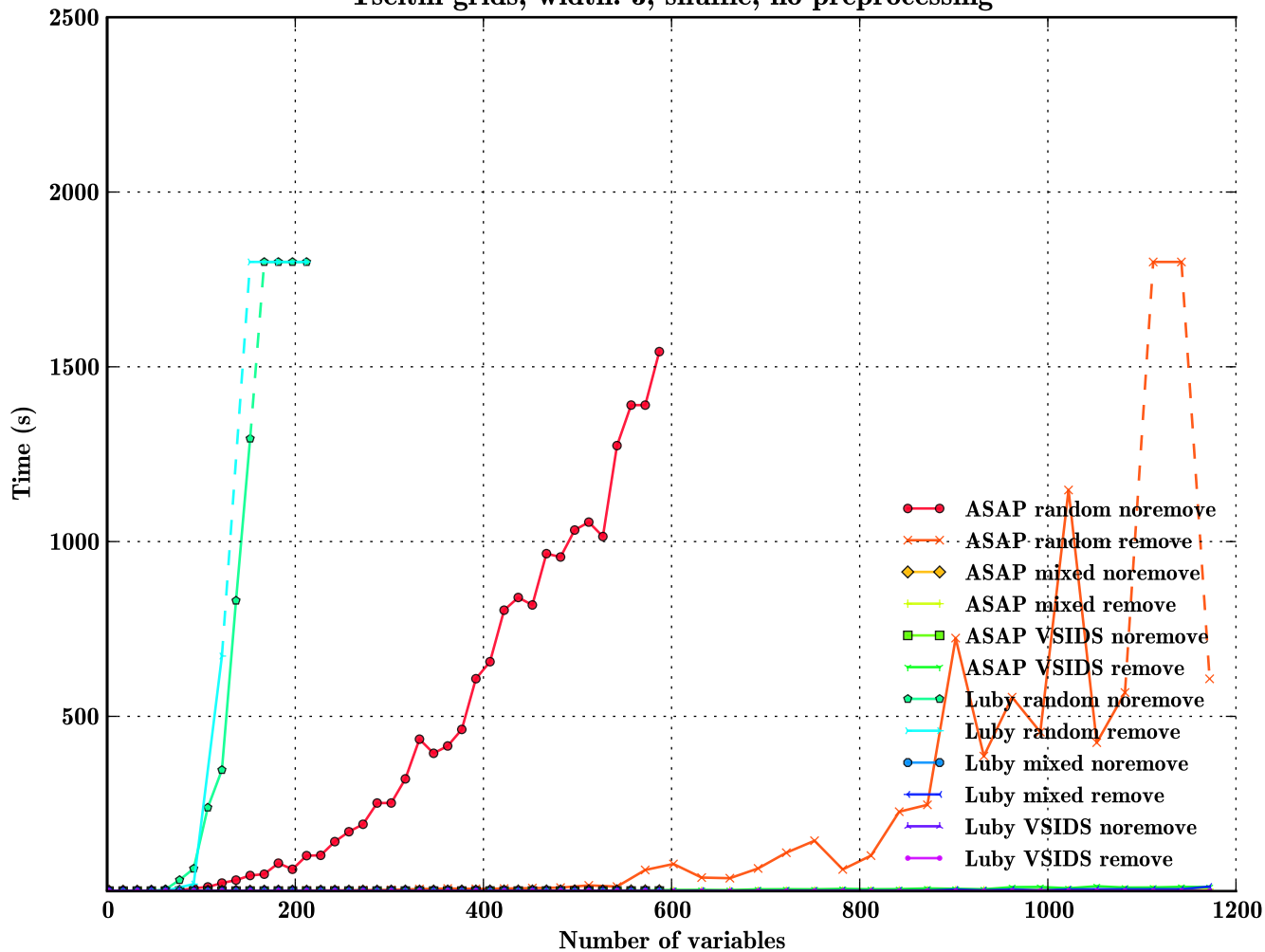
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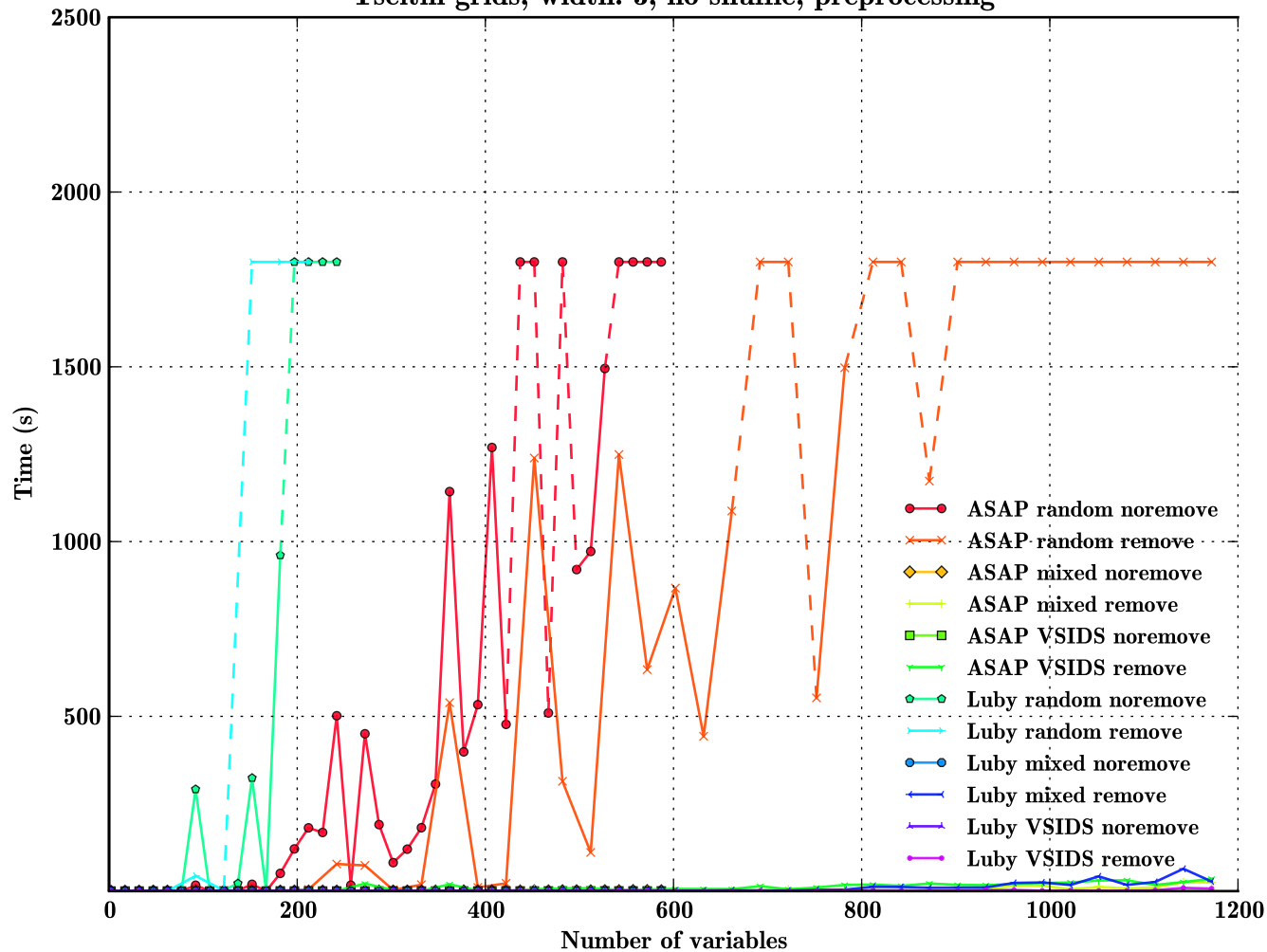
Tseitin grids, width: 3, no shuffle, no preprocessing



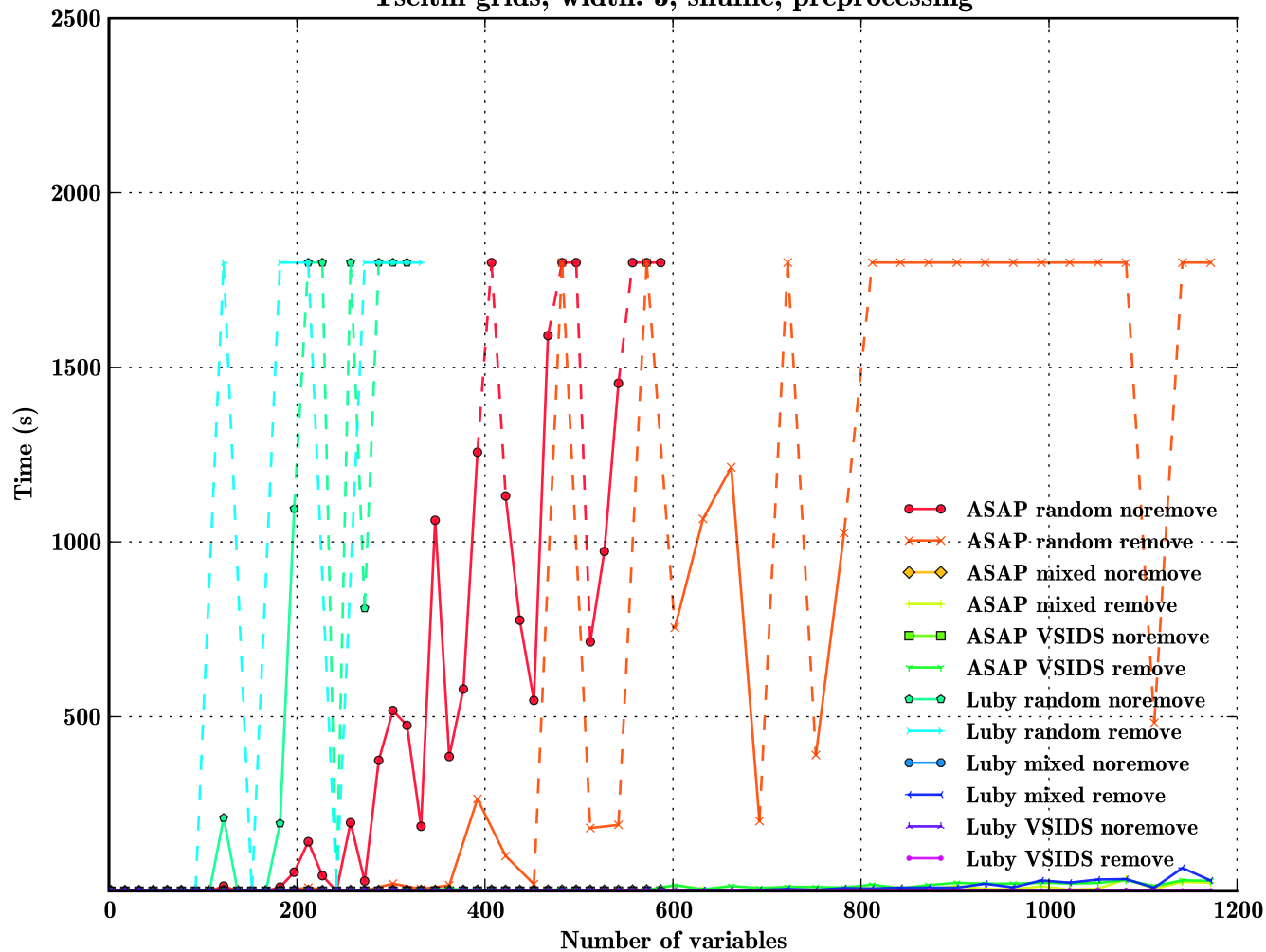
Tseitin grids, width: 3, shuffle, no preprocessing



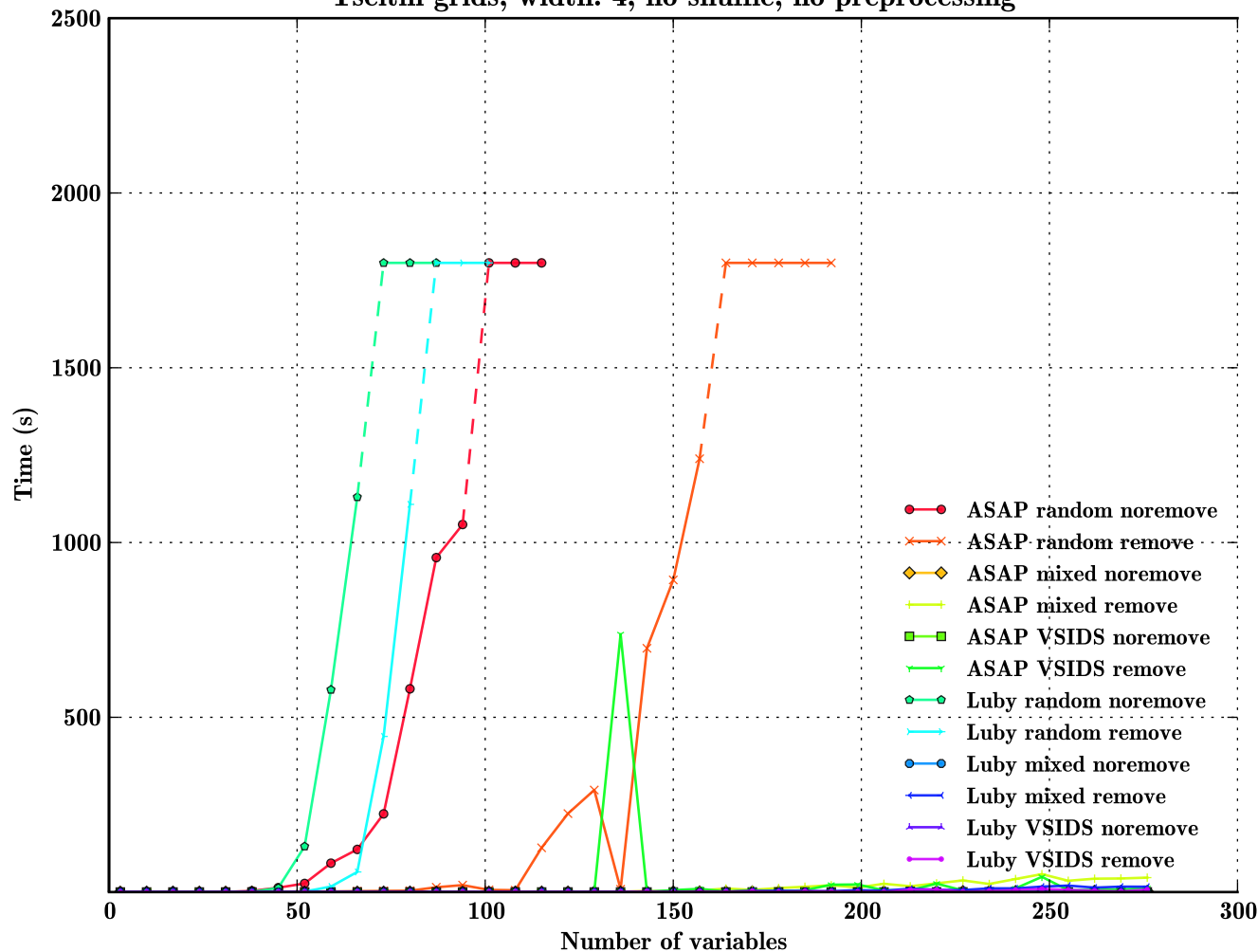
Tseitin grids, width: 3, no shuffle, preprocessing

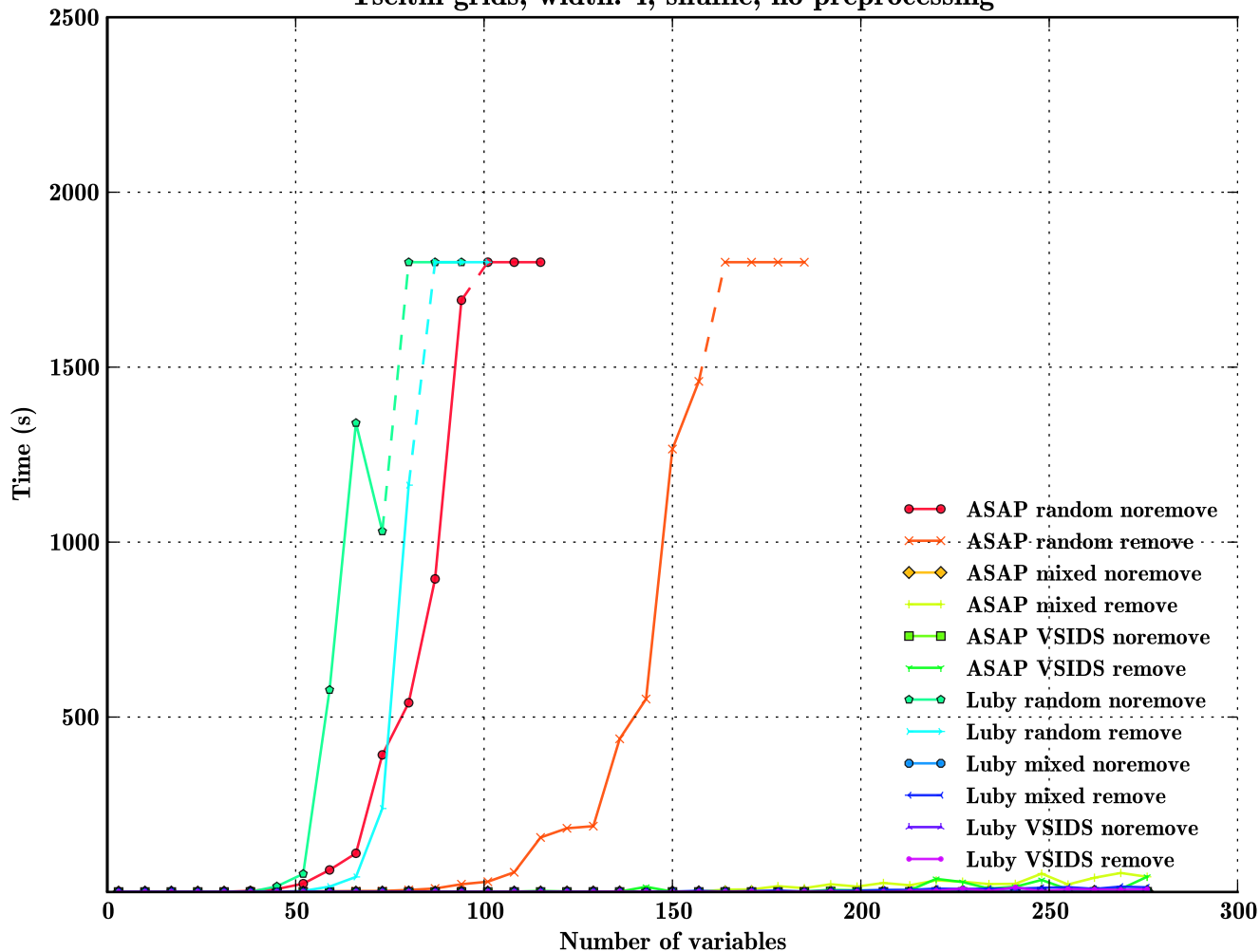


Tseitin grids, width: 3, shuffle, preprocessing

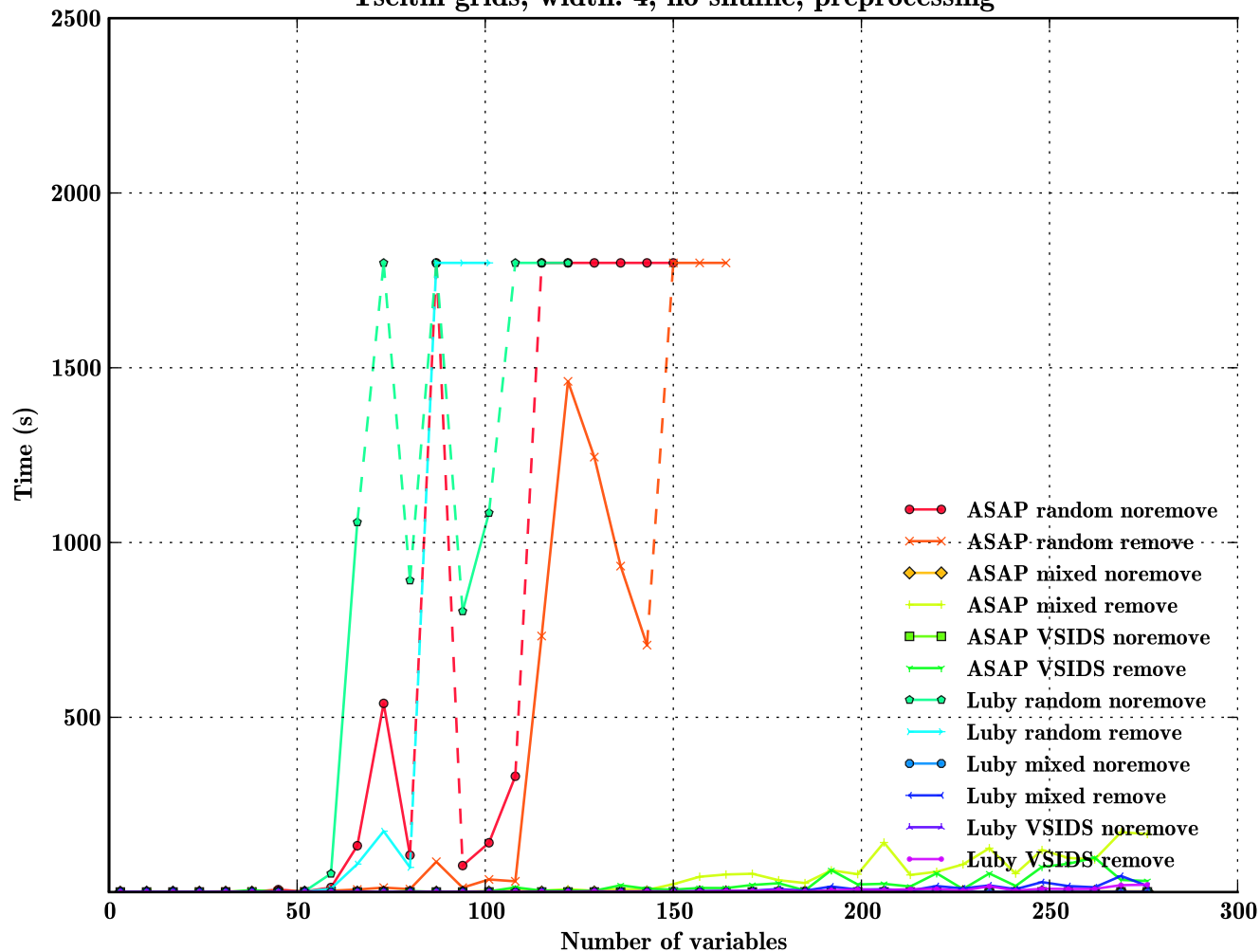


Tseitin grids, width: 4, no shuffle, no preprocessing

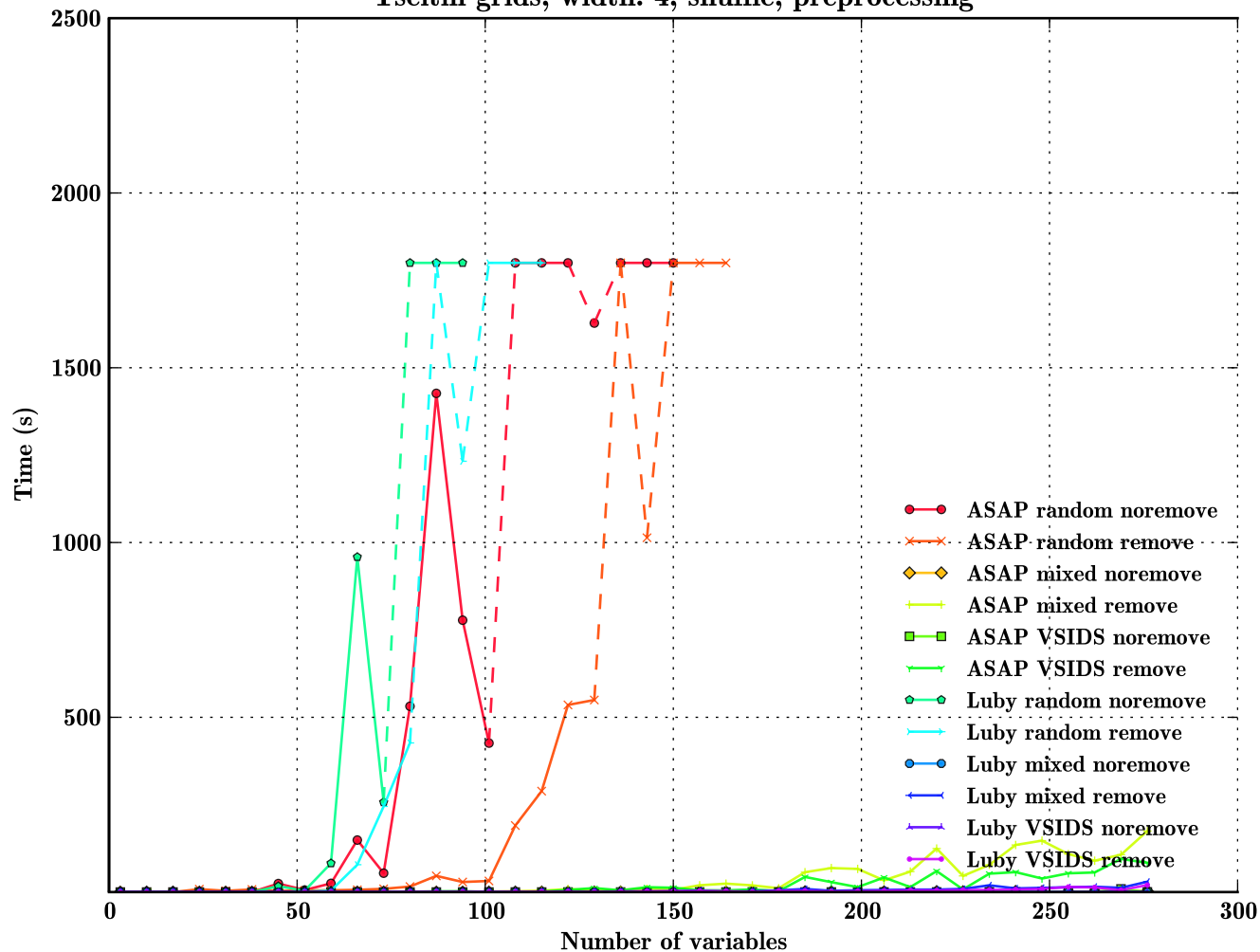




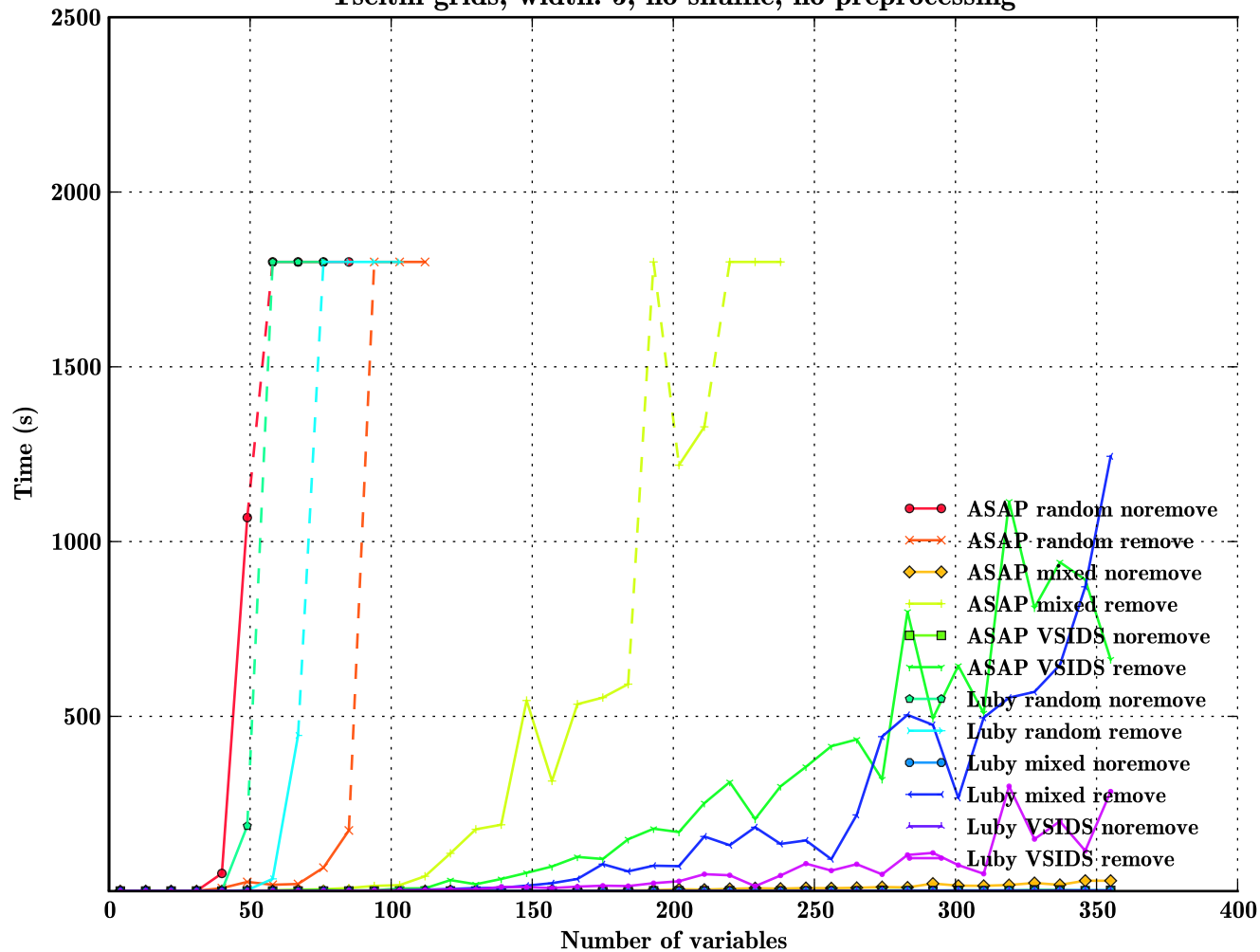
Tseitin grids, width: 4, no shuffle, preprocessing



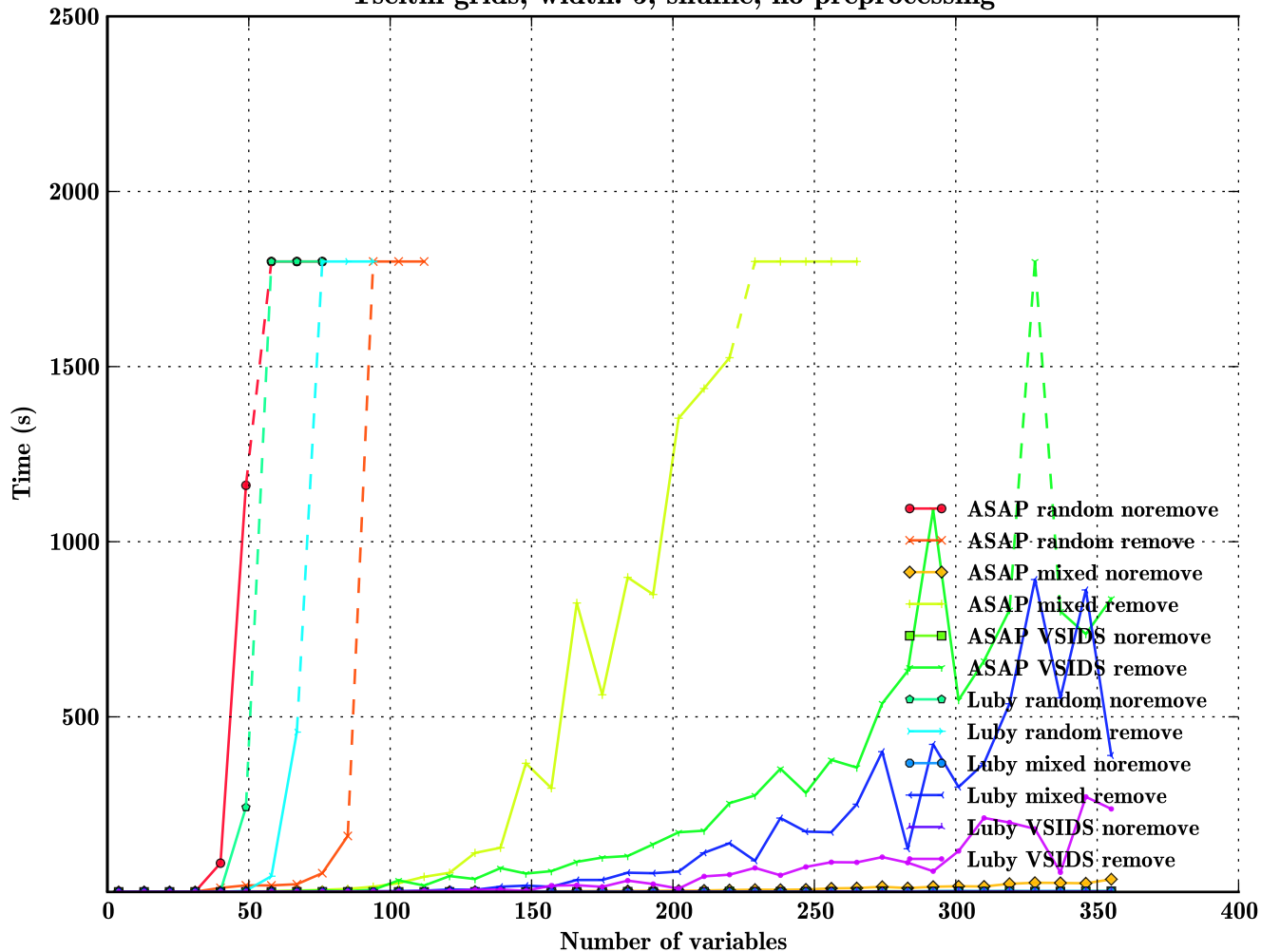
Tseitin grids, width: 4, shuffle, preprocessing



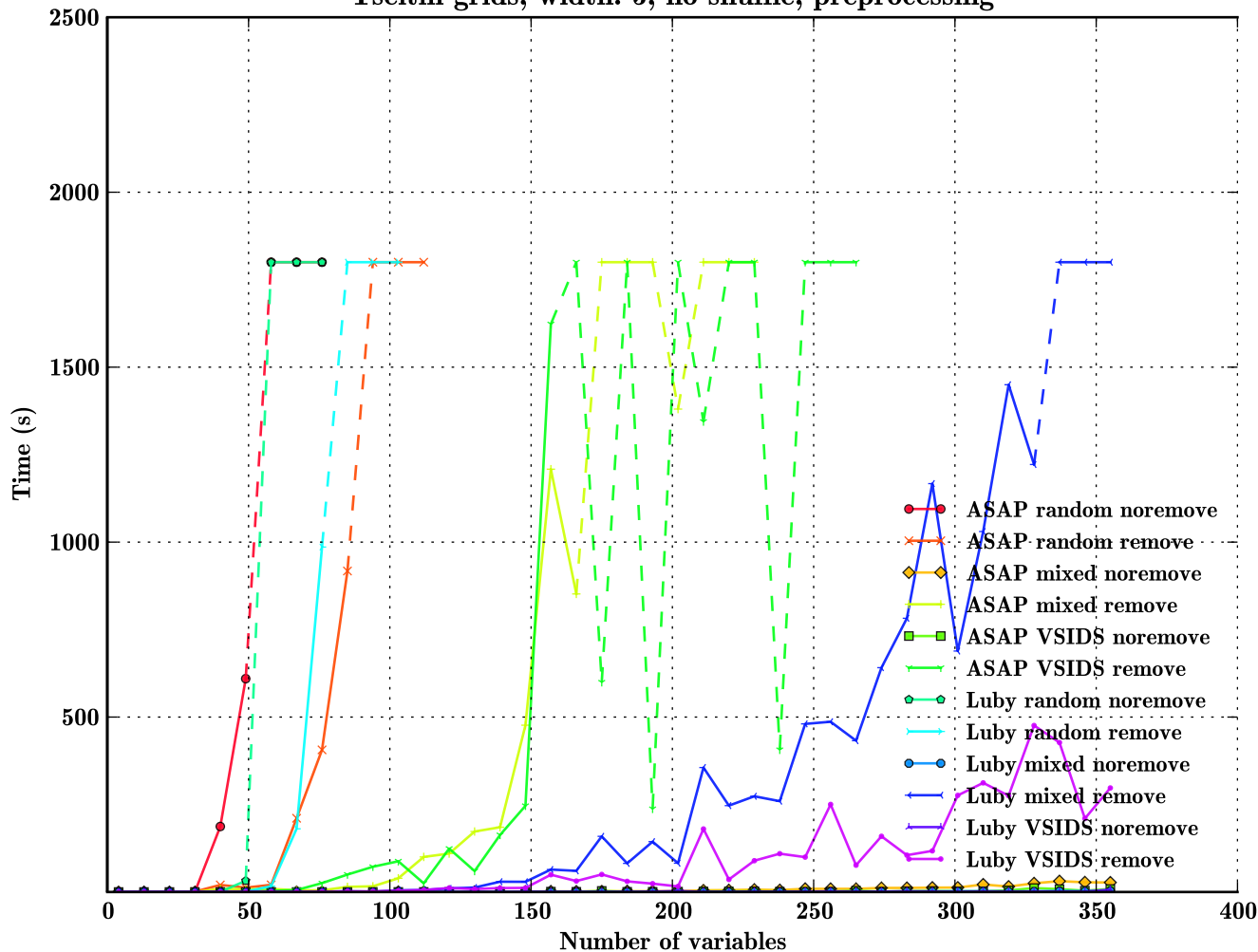
Tseitin grids, width: 5, no shuffle, no preprocessing



Tseitin grids, width: 5, shuffle, no preprocessing



Tseitin grids, width: 5, no shuffle, preprocessing



Tseitin grids, width: 5, shuffle, preprocessing

