Tool: Solver Tips

Instructions: Use the tables below to remind yourself of the features and options in Solver for Excel.

Options for all Solver methods

Parameter	Range of Values	Notes
Constraint precision	0-1	The Constraint Precision setting indicates the difference between the cell value and specified value, within which range the constrained R.H.S needs to be in order for the constraint to be satisfied.
Automatic scaling	binary	If you have a large range in constraint values (i.e. more than one order of magnitude), it is helpful to select the Use Automatic Scaling option.
Show Iteration Results	binary	Solver allows you to see how it is progressing towards an optimal solution through use of the Show Iteration Results checkbox. This feature is great for peace of mind to know Excel is actually doing something, but be careful as it slows down solution finding.
Integer constraints	binary; 0-100	When setting up constraints that are integers or binaries, you need to make sure the checkbox beside Ignore Integer Constraints is not selected. If it is, even for those constraints you have specified, say, binary outcomes, Solver will return real number values anywhere between 0 and 1. Be careful as this option is usually checked by default and may result in you getting non-integer results even though you specified them as constraints. This mis-specification of variables can become a hidden issue if you have formatted your spreadsheet such that 0.65 is displayed as 1.

Max time	no forced limit; recommend a few minutes	Keep this number reasonable in size since you can always save the solution and restart.
Iterations	no limit; recommend 20 at most	Keep this number reasonable in size since you can always save the solution and restart.
Max subproblems	integers, no forced limit	Pertains to problems with integer constraints or to models using the Evolutionary Solver. Larger values increase the chance of finding the best overall solution, but increase time to find solution. Larger numbers are recommended: 100+
Max feasible solutions	integers, no forced limit	Pertains to problems with integer constraints or to models using the Evolutionary Solver. Larger values increase the chance of finding the best overall solution, but increase time to find solution. Unless there are numerous integer constraints and/or nonsmooth objective functions, numbers <100 are adequate.

Options for GRG Nonlinear method		
Parameter	**Range of Values**	**Notes**
Convergence	0-1; recommend	Convergence dictates when Solver should stop looking for better solutions. Once the difference between the last best and the new best is less than this setting, Solver will stop and indicate it can't improve on the current solution. The recommend value depends on the scale of the objective function. Unless your objective function is very small, using a convergence of 0.001 results in satisfactory solutions.
Derivatives	binary	The GRG solver is derivative-based (i.e. differences-based), and you need to specify how it calculates differences in the objective function. The Central difference, while more accurate, requires more data and effort on behalf of Solver. So if your problem isn't too large, you are always better off going with Central versus Forward.
Multistart	binary	The GRG algorithm can be prone to finding locally optimal solutions rather than globally optimal solutions. To avoid this limitation, you can select the Multistart option. Multistart will randomly pick decision variables that are set with a range of constraints. The Multistart option has two parameters.
Population size (for multistart)	no forced limit; recommend default of 10	The first parameter specifies how many different starting points you want to use and is called Population Size. The default population size, 10, is probably a good value for most situations. Note that this is slightly different from how Population Size is used in the Evolutionary method.
Random seed (for multistart)	positive integers	By default it is set to 0. Using the same seed from one trial to the next ensures your results are reproducible.
Require bounds	binary	Keep this number reasonable in size. You can always save the solution and restart.

Options for Evolutionary method		
Parameter	**Range of Values**	**Notes**
Convergence	0-1	Convergence dictates when Solver should stop looking for better solutions. Once the difference between the last best and the new best is less than this setting, Solver will stop and indicate it can't improve of the current solution.
Mutation rate	0-1	The Mutation rate, from evolutionary biology, controls the degree to which new candidate decision variable values are different from the prior generation of decisions. Mutation rates closer to 1 will mean greater differences in new solutions, thus avoiding locally optimal solutions. As the mutation rate approaches 0, you tend to narrow in faster on a solution, since you have a pretty good idea where to start.
Population size	no forced limit; recommend minimum of 10	Going hand-in-hand with the mutation rate is the population size (i.e. how many candidate solutions you want to evaluate). Usually a larger population size and a smaller mutation rate works better than a diverse population (i.e. a larger mutation rate and smaller population size) for most problems. Note that the function of Population Size is slightly different from the how it works in the GRG method. Here it is applied at each iteration of the method and it interacts with the mutation rate.
Random seed	positive integers	This allows you to set an upper bound on how long Solver will continue to search for an optimal solution. It solves a problem created when the other parameter values may allow the Evolutionary algorithm to run indefinitely or for a longer time than you are willing to wait for a solution.
Maximum time without improvement	no forced limit; recommend a few minutes	Keep this number reasonable in size since you can always save the solution and restart.

Require bounds	binary	Keep this number reasonable in size since you can always save the solution and restart.