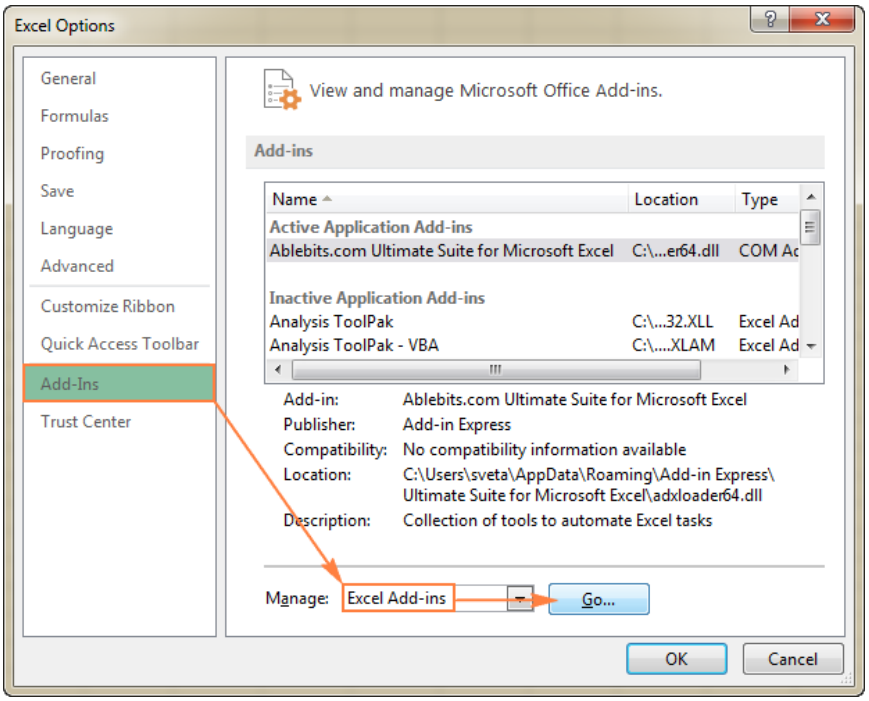
How to add Solver to Excel

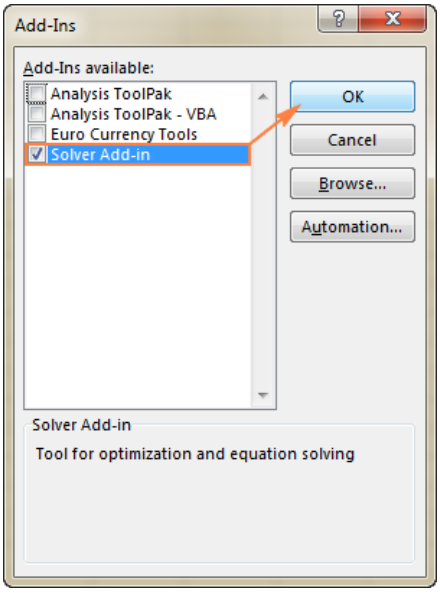
The Solver add-in is included with all versions of Microsoft Excel beginning with 2003, but it is not enabled by default.

To add Solver to your Excel, perform the following steps:

1. In **Excel 2010**, **Excel 2013**, **Excel 2016**, and **Excel 2021,** click *File* > *Options*.
   In **Excel 2007**, click the *Microsoft Office* button, and then click *Excel Options*.
2. In the *Excel Options* dialog, click *Add-Ins* on the left sidebar, make sure **Excel Add-ins** is selected in the *Manage* box at the bottom of the window, and click *Go*.

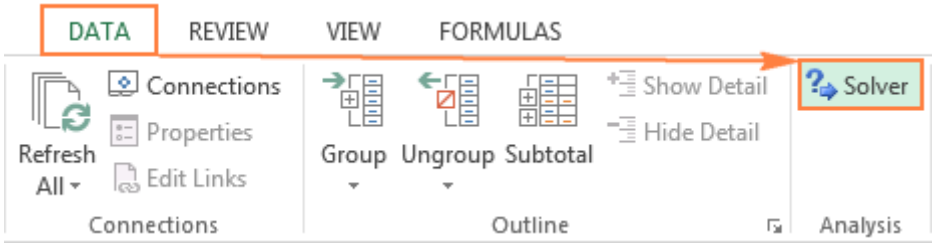


3. In the *Add-Ins* dialog box, check the **Solver Add-in** box, and click *OK*:



Where is Solver in Excel 2021, 2016, 2013, 2010 or 2007?

In the modern versions of Excel, the Solver button appears on the Data tab, in the Analyze (or Analysis) group:



How to use Solver in Excel

Before running the Excel Solver add-in, formulate the model you want to solve in a worksheet (e.g., look at the example at https://www.msubillings.edu/asc/resources/math/tutorials/finitemathhelps/Lin%20Prog%20with%20Excel.pdf -- added also to moodle).

And now, let's see how Excel Solver can find a solution for this problem.

Step 1: Run Excel Solver

On the Data tab, in the Analysis group, click the Solver button.

Step 2: Define the problem

The Solver Parameters window will open where you have to set up the 3 primary components:

- Objective cell
- Variable cells
- Constraints

Exactly what does Excel Solver do with the above parameters? It finds the optimal value (maximum, minimum or specified) for the formula in the Objective cell by changing the values in the Variable cells, and subject to limitations in the Constraints cells.

Objective

The Objective cell (Target cell in earlier Excel versions) is the cell containing a formula that represents the objective of the problem. The objective can be to maximize, minimize, or achieve some target value.

Variable cells

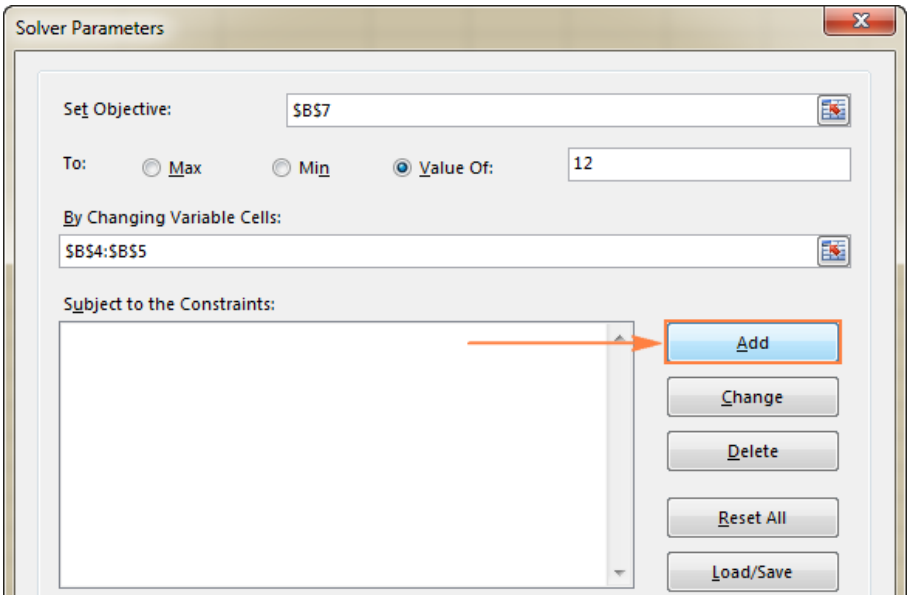
Variable cells (Changing cells or Adjustable cells in earlier versions) are cells that contain variable data that can be changed to achieve the objective. Excel Solver allows specifying up to 200 variable cells.

Constraints

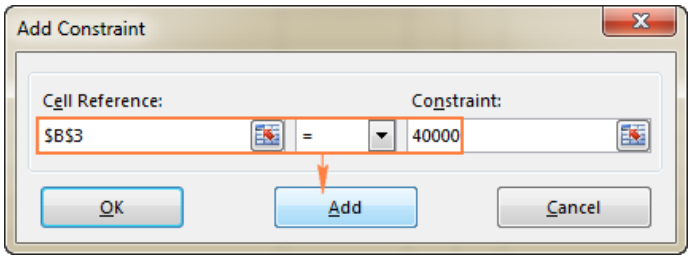
The Excel Solver *Constrains* are restrictions or limits of the possible solutions to the problem. To put it differently, constraints are the conditions that must be met.

To add a constraint(s), do the following:

- Click the **Add** button right to the "*Subject to the Constraints*" box.



- In the *Constraint* window, enter a constraint.
- Click the **Add** button to add the constraint to the list.



- Continue entering other constraints.
- After you have entered the final constraint, click **OK** to return to the main *Solver Parameters* window.

Excel Solver allows specifying the following relationships between the referenced cell and the constraint.

a) *Less than or equal to*, *equal to*, and *greater than or equal to*. You set these relationships by selecting a cell in the *Cell Reference* box, choosing one of the following signs: **<=**, **=**, or **>=**, and then typing a number, cell reference / cell name, or formula in the *Constraint* box (please see the above screenshot).

b) *Integer*. If the referenced cell must be an integer, select **int**, and the word **integer** will appear in the *Constraint* box.

c) *Different values*. If each cell in the referenced range must contain a different value, select **dif**, and the word **AllDifferent** will appear in the *Constraint* box.

d) *Binary*. If you want to limit a referenced cell either to 0 or 1, select **bin**, and the word **binary** will appear in the *Constraint* box.

Note. The *int*, *bin*, and *dif* relationships can only be used for constraints on Variable cells.

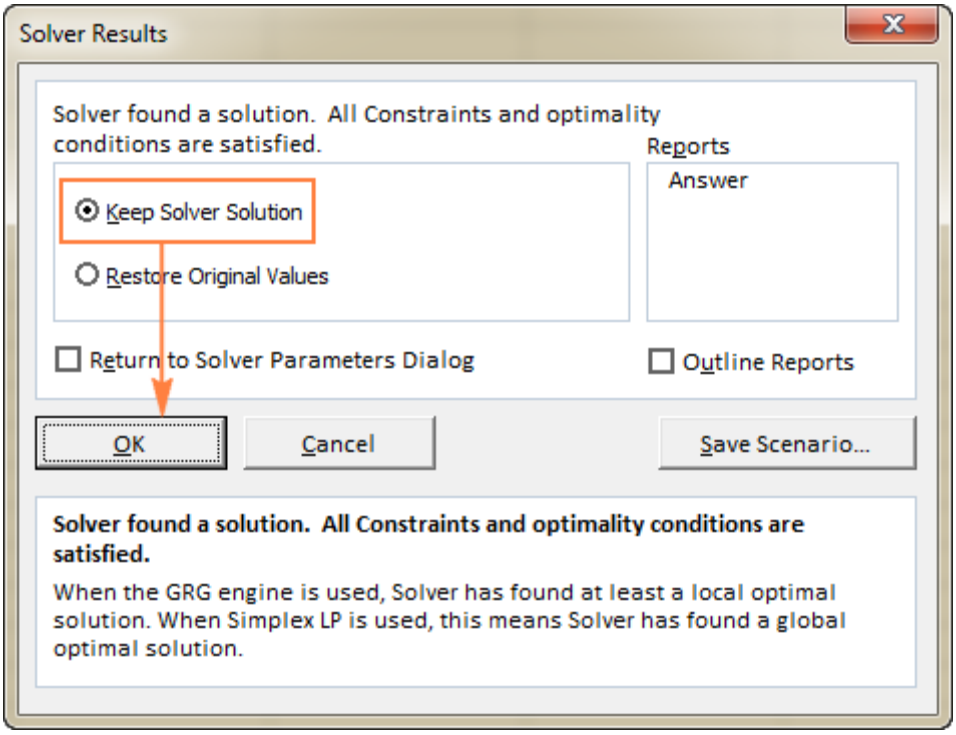
Note that you can **edit** or **delete** an existing constraint.

Step 3. Solve the problem

After you've configured all the parameters, click the **Solve** button at the bottom of the *Solver Parameters* window (see the screenshot above) and let the Excel Solver add-in find the optimal solution for your problem.

Depending on the model complexity, computer memory and processor speed, it may take a few seconds, a few minutes, or even a few hours.

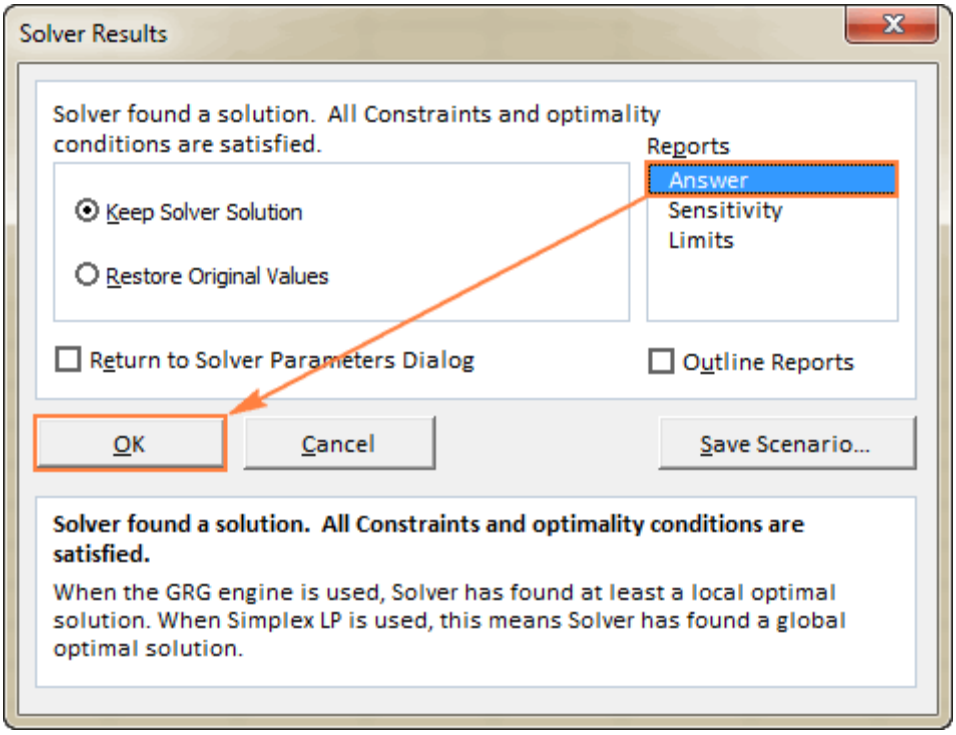
When Solver has finished processing, it will display the *Solver Results* dialog window, where you select **Keep the Solver Solution** and click ***OK***:



The *Solver Result* window will close and the solution will appear on the worksheet right away.

If the Excel Solver has been processing a certain problem for too long, you can interrupt the process by pressing the Esc key. Excel will recalculate the worksheet with the last values found for the *Variable* cells.

To get more details about the solved problem, click a report type in the **Reports** box, and then click *OK*. The report will be created on a new worksheet:



Excel Solver algorithms

When defining a problem for the Excel Solver, you can choose one of the following methods in the *Select a Solving Method* dropdown box:

a) **GRG Nonlinear.** *Generalized Reduced Gradient Nonlinear* algorithm is used for problems that are smooth nonlinear, i.e. in which at least one of the constraints is a smooth nonlinear function of the decision variables.

b) **LP Simplex**. The Simplex LP Solving method is based the Simplex algorithm created by an American mathematical scientist George Dantzig. It is used for solving so called *Linear Programming* problems - mathematical models whose requirements are characterized by linear relationships, i.e. consist of a single objective represented by a linear equation that must be maximized or minimized.

c) **Evolutionary**. It is used for non-smooth problems, which are the most difficult type of optimization problems to solve because some of the functions are non-smooth or even discontinuous, and therefore it's difficult to determine the direction in which a function is increasing or decreasing.

To change how Solver finds a solution, click the **Options** button in the *Solver Parameters* dialog box, and configure any or all options on the *GRG Nonlinear*, *All Methods*, and *Evolutionary* tabs.