

Debugging the Solver – How to Ask for Solver Help!

This document was from the Discussion Forum post by NaN-2K, Community TA Extraordinaire. .

List of KNOWN problems:

- (1) The Linear solver in Excel 2007 *may* be violating constraints. One student has suggested that clearing the cells of all the decision variables and then invoking solver can help in some cases. We are unable to confirm this (since we don't have Excel 2007) but it may not hurt to try this out.
- (2) Excel 2007 *may* be missing the GRG Non-linear solver used in Week 2 (Weber distance)
- (3) The Linear solver in OpenOffice version of Calc. *may* be violation constraints.
- (4) Excel 2007 and Excel 2008 users must make sure that in the "Solver Options" window, the value for "Tolerance" (or "Integer Tolerance") should be set to 0%. The default value of 5% may be causing Solver to terminate the search prematurely and result in a sub-optimal solution.
- (5) Excel 2007 and Excel 2008 users must make sure that the "Use Automatic Scaling" check-box in the "Solver Options" window is selected. Without this selection, Solver may be terminating its search earlier (or finding the wrong problem because of scaling related numerical precision issues).

Before we get to the instructions, a funny video in case you don't know about "Help Me, Help You":
<https://www.youtube.com/watch?v=Mzfc9rjow9g>

If you have trouble getting the correct answers with Solver, here are some steps that you want to go through to help us, the community TA's, help you! Please read these instructions carefully and provide **ALL** of the information requested. **Your chances of getting a timely and useful reply will improve if you provide ALL of the information requested.**

Step 1 If there is a HINT provided in the problem, make sure that you have already tried to reproduce the results described in the hint

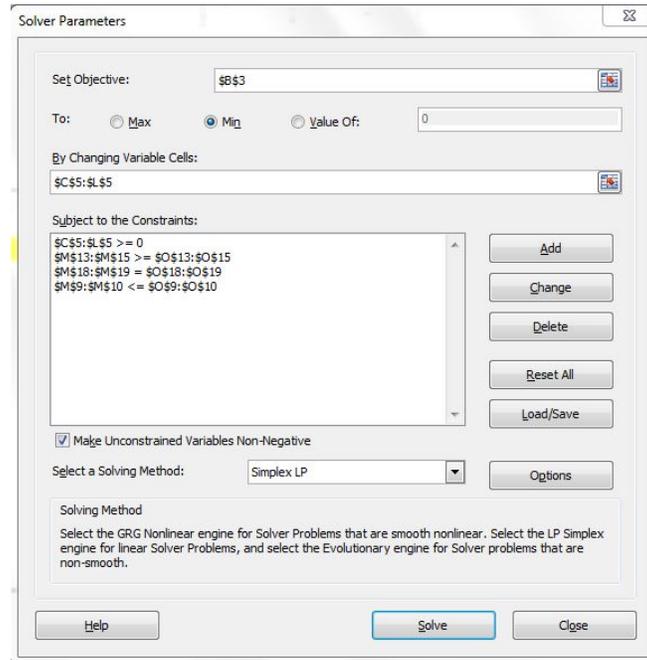
Step 2 If you are unable to reproduce the HINT, or have mismatches with the other models, **then we need screenshots of your spreadsheet to help you further.** Here is the list of the FOUR screenshots that are useful:

1st Screenshot: A screenshot of the spreadsheet including all cells that are relevant (difficult for the larger problems, but please try). Here is a sample from the transshipment problem for SandyCo:

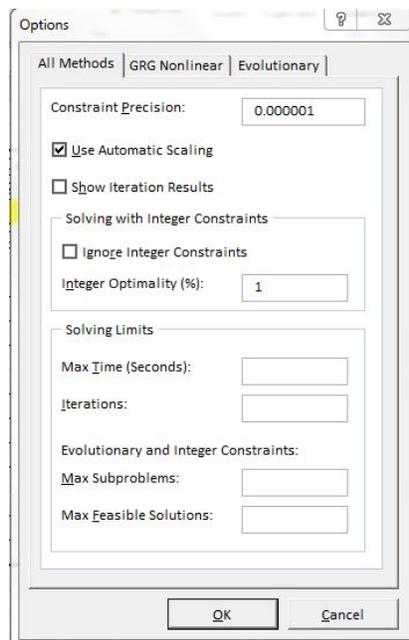
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
1	SandyCo - Transshipment Problem Example															
2																
3		z =	1820	Plant to Centers				Centers to Regions								
4				x1A	x1B	x2A	x2B	xA1	xA2	xA3	xB1	xB2	xB3			
5		Dec Vars	1	1	1	1	1	1	1	1	1	1	1			
6		Cost \$/ton	190	210	185	205	175	180	165	235	130	145				
7																
8		Supply Constraints											LHS	RHS		
9		Plant 1	1	1										2	≤ 100	
10		Plant 2			1	1								2	≤ 125	
11																
12		Demand Constraints														
13		Region 1					1			1				2	≥ 25	
14		Region 2						1			1			2	≥ 95	
15		Region 3							1			1		2	≥ 80	
16																
17		Conservation of Flow Constraints														
18		Center A	1		1		-1	-1	-1					-1	= 0	
19		Center B		1		1					-1	-1	-1	-1	= 0	
20																

Note how we have included the column and row headers (highlighted in yellow); if you don't include these, then we don't know how to refer to specific cells! It makes our explanation less clear if we cannot give a direct cell reference.

2nd Screenshot: A screenshot of the solver window (where you set up the objective, constraints, decision variables). Here is an example from the same SandyCo transshipment problem:



3rd Screenshot A screenshot of the solver options screen when you click on the options button in the above screen:



Keep in mind that these screens may look different based on the version of Excel or LibreOffice you have; nevertheless, you should be able to access such screens.

4th Screenshot (very useful) A screenshot of your spreadsheet that shows us the formulas (instead of the values). Here is an example with the SandyCo transshipment spreadsheet:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	SandyCo - Transshipment Problem Example														
2															
3		z =	=SUMPRODUCT(C5:L5,C6:L6)		Plant to Centers				Centers to Regions						
4			x1A	x1B	x2A	x2B	xA1	xA2	xA3	xB1	xB2	xB3			
5		Dec Vars	1	1	1	1	1	1	1	1	1	1			
6		Cost \$/ton	190	210	185	205	175	180	165	235	130	145			
7															
8	Supply Constraints												LHS		RHS
9		Plant 1	1	1									=SUMPRODUCT(C9:L9,\$C\$5:\$L\$5)	≤	100
10		Plant 2			1	1							=SUMPRODUCT(C10:L10,\$C\$5:\$L\$5)	≤	125
11															
12	Demand Constraints														
13		Region 1					1			1			=SUMPRODUCT(C13:L13,\$C\$5:\$L\$5)	≥	25
14		Region 2						1			1		=SUMPRODUCT(C14:L14,\$C\$5:\$L\$5)	≥	95
15		Region 3							1			1	=SUMPRODUCT(C15:L15,\$C\$5:\$L\$5)	≥	80
16															
17	Conservation of Flow Constraints														
18		Center A	1		1		-1	-1	-1				=SUMPRODUCT(C18:L18,\$C\$5:\$L\$5)	=	0
19		Center B		1		1					-1	-1	=SUMPRODUCT(C19:L19,\$C\$5:\$L\$5)	=	0

This will help us spot if there are errors in your SUMPRODUCT formulas or other formulas you use. To get this view in Excel (as well as LibreOffice), you simply press **Ctrl+`** --> that is, **hold the control key down, and then also press the "back-tick" key**. You can use the same key combination to toggle between the formula and the value view in Excel and LibreOffice. Note that you may have to resize your cells for the full formula to be visible.

If you are unable to locate the "back-tick" key, the following link may be useful:

<https://superuser.com/questions/254076/how-do-i-type-the-tick-and-backtick-characters-on-windows>

If you have generated these 4 screenshots, please study them in detail. There is a good chance that you can spot the problem on your own. For example, you may have the wrong formula in one of the cells (using SUM instead of SUMPRODUCT); or you may have setup the constraints incorrectly; or you may have selected the wrong solver /parameter. If you've not resolved the problem yourself after studying these screenshots, please continue reading further...

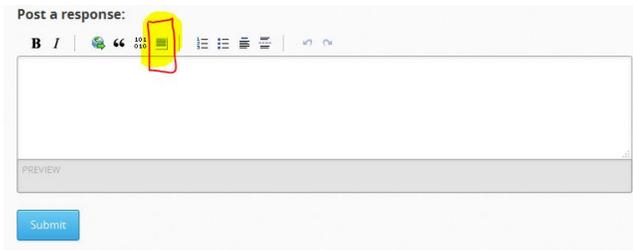
Step 3 Rather than us ask for these screenshots one at a time, **providing all 4 of them at one go will help save all of us time.**

Step 4 If you don't know how to create screenshots easily:

- **On Windows: Snipping Tool** -- <http://windows.microsoft.com/en-in/windows/use-snipping-tool-capture-screen-shots#1TC=windows-vista>
- **Linux:** Several options; **Gimp** is a good choice -- <http://www.thegeekstuff.com/2012/08/screenshot-ubuntu/>
- **Mac:** <https://support.apple.com/en-in/HT201361>

Step 5 If you have trouble uploading the image to the discussion forum post, follow the instructions below:

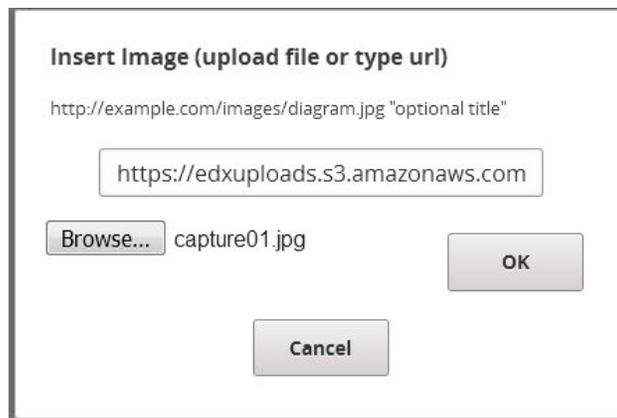
(a) Click on the following icon to start uploading your screenshot image file:



(b) You will be presented with a pop-up window like the one below (note that the URL field is empty):



(c) You will need to upload your screenshot image file by clicking on the "Browse" button and locating your local file. When you click on "Browse" to upload the screenshot image file, ***please wait until the URL is populated; only then click on the OK button - otherwise, the upload will not have completed and the image will not show up in your post.*** Here is how the URL field would look like after the upload is complete:



(d) Please be patient. The upload process sometimes takes several seconds depending on the load on the servers as well your Internet connection speed etc.

(6) Provide us with the details of:

- Your operating system and version (for example, Windows 7, Windows 8.1, Debian 7, Ubuntu 14.04 etc..)
- Your spreadsheet software and version (for example, Excel 2007, Excel 2010, Excel 2013, LibreOffice 4.4.5 etc...)