Microsoft Excel Solver Function

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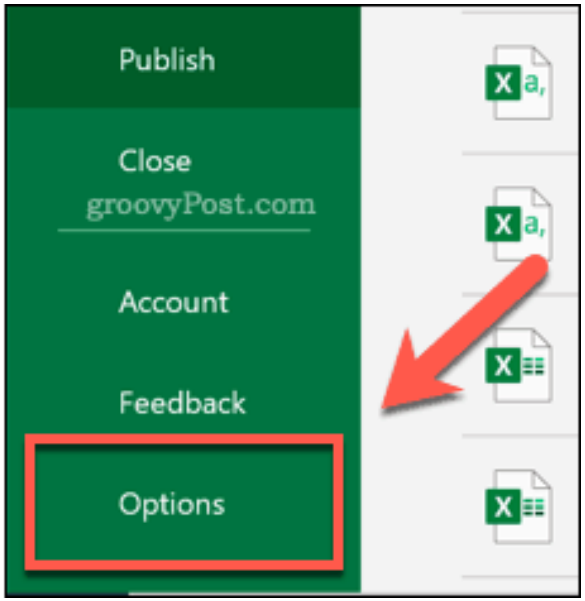
Excel Solver Function

Included in Excel, but disabled by default

Installation Instructions

Open Excel and click on **File > Options** to open the Excel Options menu:



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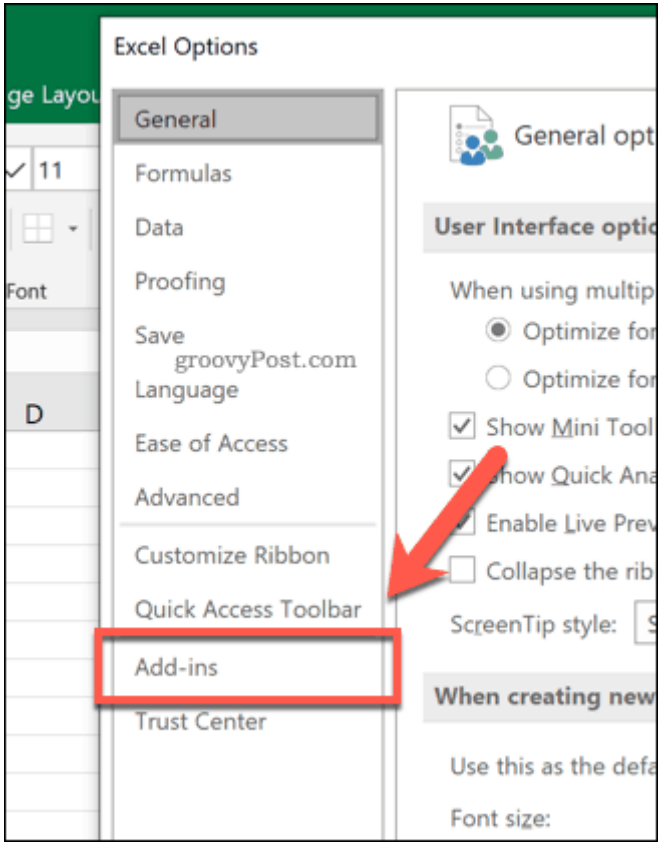
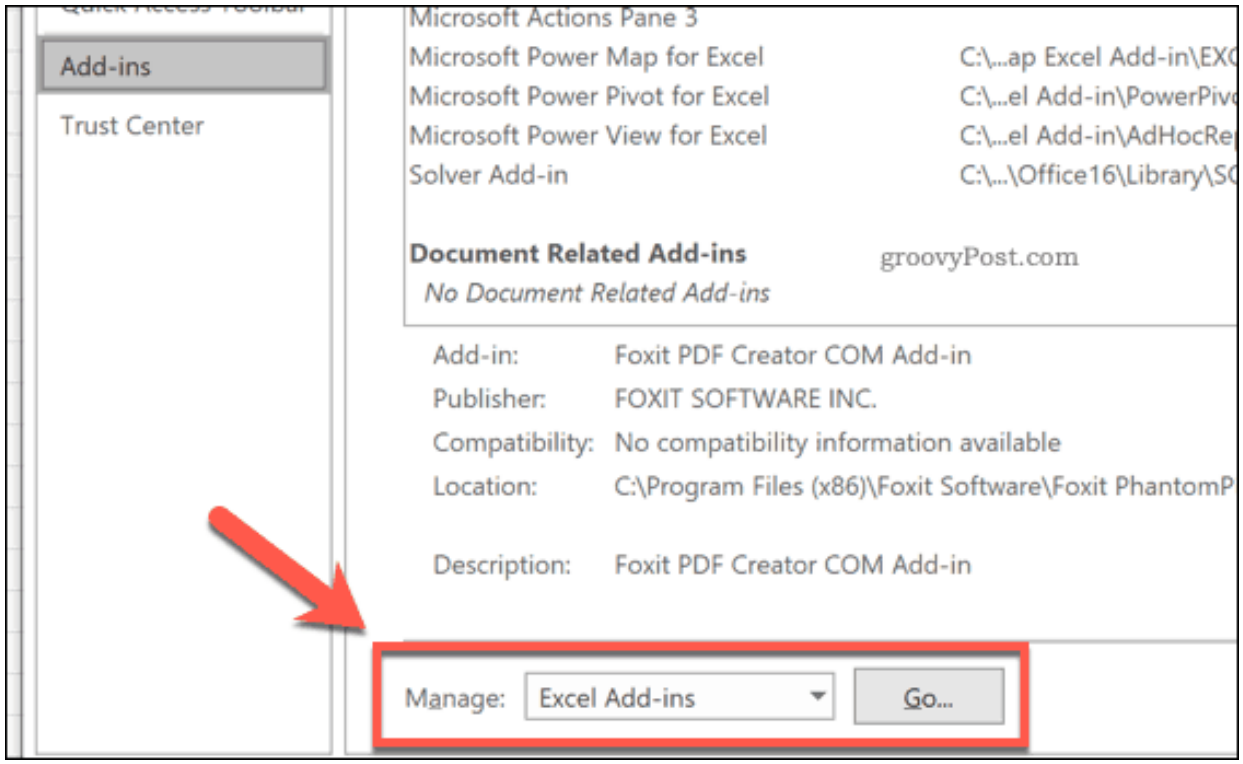
Excel Solver Function

In the **Excel Options** window, click on the **Add-ins** tab to view the settings for Excel add-ins:



Excel Solver Function

Select **Excel add-ins** from the **Manage** drop-down menu at the bottom of the window, then click on the **Go** button.



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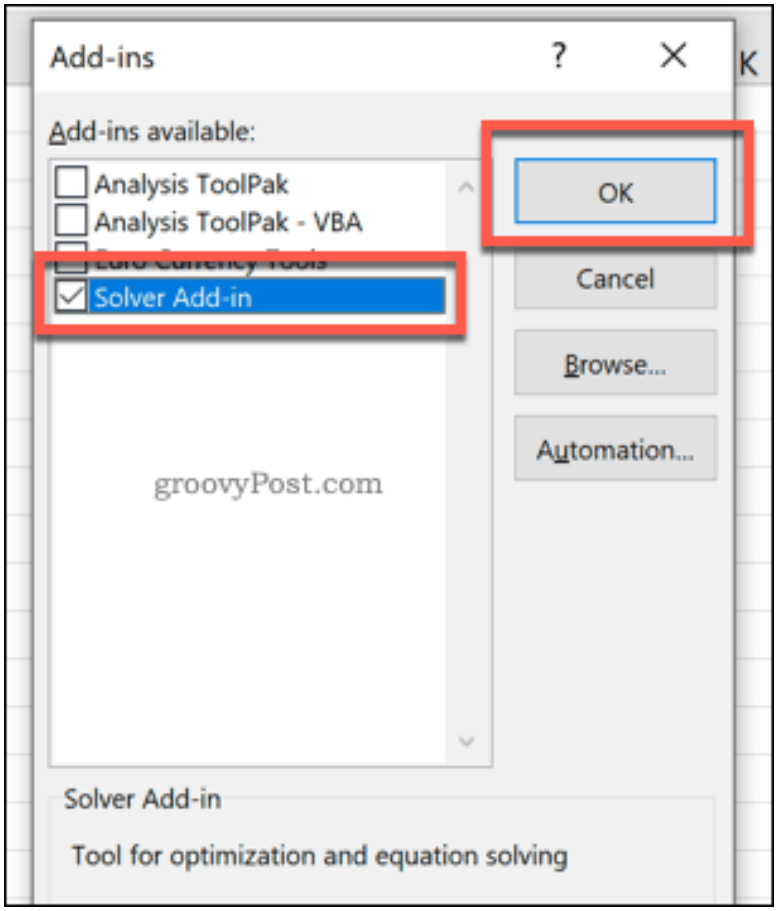
Excel Solver Function

In the **Add-ins** window, click on the checkbox next to the **Solver Add-in** option, then click on **OK** to confirm.



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	Mission Requirements
Max. Mach	0.85
Cruise Mach	0.8
Cruise Alt. (ft)	36,000
Range (nm)	5,200
Payload: Non-exp. (lb)	84,000
Engine: TSFC Min.	0.200000
Engine: Thrust (lbs)	128,000
Aspect Ratio	8.79
Structure Factor	0.5069
Loiter: Time (min)	45
Loiter: Altitude (ft)	10,000
Fuel Reserve (%)	5
Trapped Fuel (%)	1

ITERTOW.XLS

Find the TSFC that will result in

Takeoff Gross Weight = 361,600

Empty Weight = 183,300

		Iteration 1	Iteration 2	Iteration 3	Iteration 4	Iteration 5	Iteration 6	Iteration 7
Weight: T-O (estimated)	400,000	400,000.00	367,139.31	287,521.84	287,521.84	#DIV/0!	#DIV/0!	#DIV/0!
Weight: T-O (final)		367,139.31	343,878.93	287,521.84	287,521.84	#DIV/0!	#DIV/0!	#DIV/0!
Surplus Empty Wt. (lbs)		32,860.69	23,260.38	0.00	0.00	#DIV/0!	#DIV/0!	#DIV/0!
1. Start-up & T-O		390,000.00	357,960.83	280,333.79	280,333.79	#DIV/0!	#DIV/0!	#DIV/0!
2. Climb & Accel. to Cruise		377,520.00	346,506.08	271,363.11	271,363.11	#DIV/0!	#DIV/0!	#DIV/0!
3a. L/D		18.79	18.79	18.79	18.79	18.79	18.79	18.79
3b. V (f/s)		785.28	785.28	785.28	785.28	785.28	785.28	785.28
3c. Cruise to destination		335,152.70	307,619.32	240,909.30	240,909.30	#DIV/0!	#DIV/0!	#DIV/0!
4. Loiter		332,487.83	305,173.39	238,993.78	238,993.78	#DIV/0!	#DIV/0!	#DIV/0!
5. Land		324,175.64	297,544.05	233,018.94	233,018.94	#DIV/0!	#DIV/0!	#DIV/0!
Total Fuel Wt. (lbs)		80,373.82	73,770.98	57,773.07	57,773.07	#DIV/0!	#DIV/0!	#DIV/0!
Available Empty Wt. (lbs)		235,626.18	209,368.33	145,748.76	145,748.76	#DIV/0!	#DIV/0!	#DIV/0!
Required Empty Wt. (lbs)		202,765.49	186,107.95	145,748.76	145,748.76	#DIV/0!	#DIV/0!	#DIV/0!

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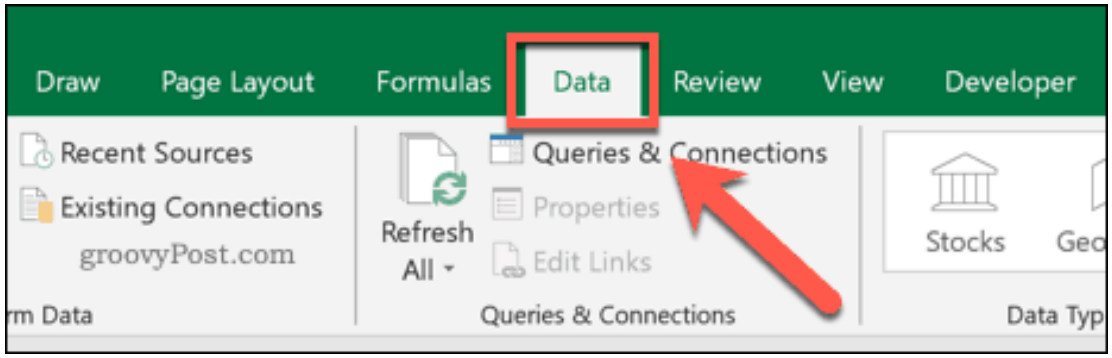
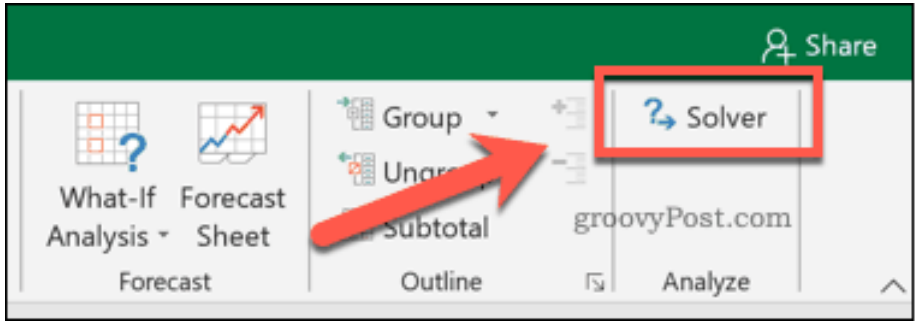
Excel Solver Function

To use Solver, click on the **Data** tab on the Excel ribbon bar.



In the **Analyze** section, click on the **Solver** option.



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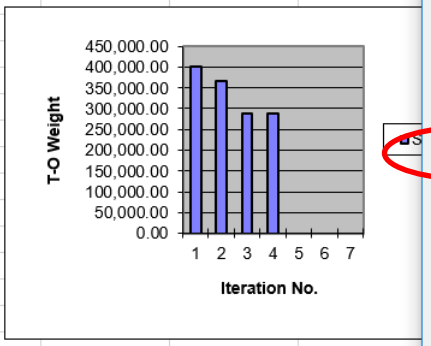
Get Data | From Text/CSV | From Web | From Table/ Range | Recent Sources | Existing Connections | Refresh All | Queries & Connections | Properties | Edit Links | Stocks | Geography | Sort | Filter | Clear | Reapply | Advanced | Text to Columns | Flash Fill | Remove Duplicates | Data Validation | Consolidate | Relationships | Manage Data Model | What-If Analysis | Forecast Sheet

Get & Transform Data | Queries & Connections | Data Types | Sort & Filter | Data Tools | Forecast

CMN | =E23-E25/((E25-D25)/(E23-D23))

	A	B	C	D	E	F	G	H	I
1		Mission Requirements							
2									
3	Max. Mach	0.85							
4	Cruise Mach	0.8							
5	Cruise Alt. (ft)	36,000							
6	Range (nm)	5,200							
7	Payload: Non-exp. (lb)	84,000							
8									
9	Engine: TSFC Min.	0.200000							
10	Engine: Thrust (lbs)	128,000							
11	Aspect Ratio	8.79							
12	Structure Factor	0.5069							
13									
14	Loiter: Time (min)	45							
15	Loiter: Altitude (ft)	10,000							
16	Fuel Reserve (%)	5							
17	Trapped Fuel (%)	1							
18									
19									
20									
21									
22			Iteration 1	Iteration 2	Iteration 3	Iteration 4	Iteration 5		
23	Weight: T-O (estimated)	400,000	400,000.00	367,139.31	287,521.84	287,521.84	#DIV/0!		
24	Weight: T-O (final)		367,139.31	343,878.93	287,521.84	287,521.84	#DIV/0!		
25	Surplus Empty Wt. (lbs)		32,860.69	23,260.38	0.00	0.00	#DIV/0!		
26									
27	1. Start-up & T-O		390,000.00	357,960.83	280,333.79	280,333.79	#DIV/0!		
28	2. Climb & Accel. to Cruise		377,520.00	346,506.08	271,363.11	271,363.11	#DIV/0!		
29	3a. L/D		18.79	18.79	18.79	18.79	18.79		
30	3b. V (f/s)		785.28	785.28	785.28	785.28	785.28		
31	3c. Cruise to destination		335,152.70	307,619.32	240,909.30	240,909.30	#DIV/0!	#DIV/0!	#DIV/0!
32	4. Loiter		332,487.83	305,173.39	238,993.78	238,993.78	#DIV/0!	#DIV/0!	#DIV/0!
33	5. Land		324,175.64	297,544.05	233,018.94	233,018.94	#DIV/0!	#DIV/0!	#DIV/0!
34									
35	Total Fuel Wt. (lbs)		80,373.82	73,770.98	57,773.07	57,773.07	#DIV/0!	#DIV/0!	#DIV/0!
36	Available Empty Wt. (lbs)		235,626.18	209,368.33	145,748.76	145,748.76	#DIV/0!	#DIV/0!	#DIV/0!
37	Required Empty Wt. (lbs)		202,765.49	186,107.95	145,748.76	145,748.76	#DIV/0!	#DIV/0!	#DIV/0!
38									



Solver Parameters

Set Objective: F23

To: Max Min Value Of: 361600

By Changing Variable Cells: B9

Subject to the Constraints:

Add | Change | Delete | Reset All | Load/Save

Make Unconstrained Variables Non-Negative

Select a Solving Method: GRG Nonlinear | Options

Solving Method

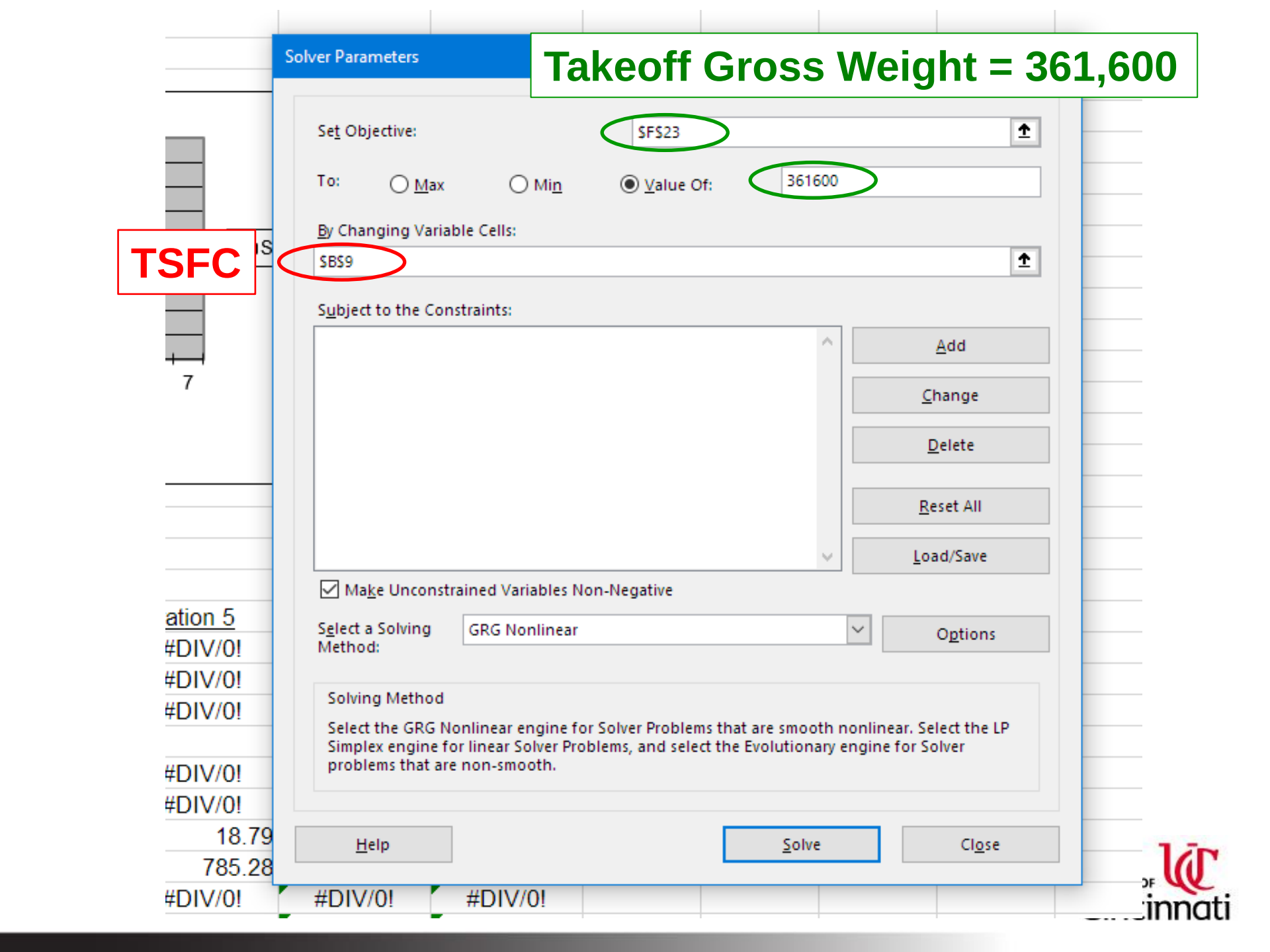
Select the GRG Nonlinear engine for Solver Problems that are smooth nonlinear. Select the LP Simplex engine for linear Solver Problems, and select the Evolutionary engine for Solver problems that are non-smooth.

Help | Solve | Close

ITERTOW

Point

Type here to search


Takeoff Gross Weight = 361,600
TSFC
Solver Parameters
Set Objective:
F23
To:
Max
Min
Value Of:
361600
By Changing Variable Cells:
B9
Subject to the Constraints:
Add
Change
Delete
Reset All
Load/Save
Make Unconstrained Variables Non-Negative
Select a Solving Method:
GRG Nonlinear
Options
Solving Method
Select the GRG Nonlinear engine for Solver Problems that are smooth nonlinear. Select the LP Simplex engine for linear Solver Problems, and select the Evolutionary engine for Solver problems that are non-smooth.
Help
Solve
Close
ation 5
#DIV/0!
#DIV/0!
#DIV/0!
#DIV/0!
#DIV/0!
18.79
785.28
#DIV/0!
#DIV/0!
#DIV/0!
7

AutoSave Off | 1 - ITERTOW with Solver.xlsx | Search

File Home Insert Page Layout Formulas Data Review View Developer Help

Get Data | From Text/CSV | From Web | From Table/ Range | Recent Sources | Existing Connections | Refresh All | Queries & Connections | Properties | Edit Links | Stocks | Geography | Sort | Filter | Clear | Reapply | Advanced | Text to Columns | Flash Fill | Remove Duplicates | Data Validation | Consolidate | Relationships | Manage Data Model | What-If Analysis | Forecast Sheet

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11	Aspect Ratio	8.79							
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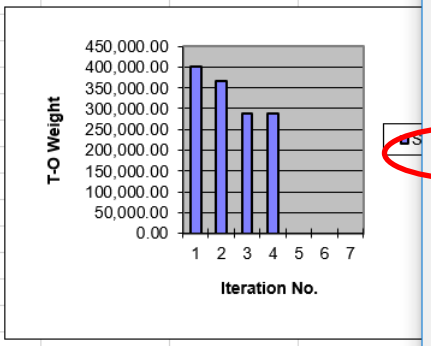

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Point

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	Mission Requirements
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Cruise Mach	0.8
Cruise Alt. (ft)	36,000
Range (nm)	5,200
Payload: Non-exp. (lb)	84,000
Engine: TSFC Min.	0.313707
Engine: Thrust (lbs)	128,000
Aspect Ratio	8.79
Structure Factor	0.5069
Loiter: Time (min)	45
Loiter: Altitude (ft)	10,000
Fuel Reserve (%)	5
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ITERTOW.XLS

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Empty Weight = 183,300

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Weight: T-O (estimated)	400,000	400,000.00	391,079.65	361,600.00	361,600.00	#DIV/0!	#DIV/0!	#DIV/0!
Weight: T-O (final)		391,079.65	384,231.50	361,600.00	361,600.00	#DIV/0!	#DIV/0!	#DIV/0!
Surplus Empty Wt. (lbs)		8,920.35	6,848.15	0.00	0.00	#DIV/0!	#DIV/0!	#DIV/0!
1. Start-up & T-O		390,000.00	381,302.66	352,560.00	352,560.00	#DIV/0!	#DIV/0!	#DIV/0!
2. Climb & Accel. to Cruise		377,520.00	369,100.97	341,278.08	341,278.08	#DIV/0!	#DIV/0!	#DIV/0!
3a. L/D		18.79	18.79	18.79	18.79	18.79	18.79	18.79
3b. V (f/s)		785.28	785.28	785.28	785.28	785.28	785.28	785.28
3c. Cruise to destination		313,221.07	306,235.96	283,151.85	283,151.85	#DIV/0!	#DIV/0!	#DIV/0!
4. Loiter		309,323.50	302,425.32	279,628.45	279,628.45	#DIV/0!	#DIV/0!	#DIV/0!
5. Land		301,590.42	294,864.68	272,637.74	272,637.74	#DIV/0!	#DIV/0!	#DIV/0!
Total Fuel Wt. (lbs)		104,314.16	101,987.86	94,300.00	94,300.00	#DIV/0!	#DIV/0!	#DIV/0!
Available Empty Wt. (lbs)		211,685.84	205,091.78	183,300.00	183,300.00	#DIV/0!	#DIV/0!	#DIV/0!
Required Empty Wt. (lbs)		202,765.49	198,243.64	183,300.00	183,300.00	#DIV/0!	#DIV/0!	#DIV/0!

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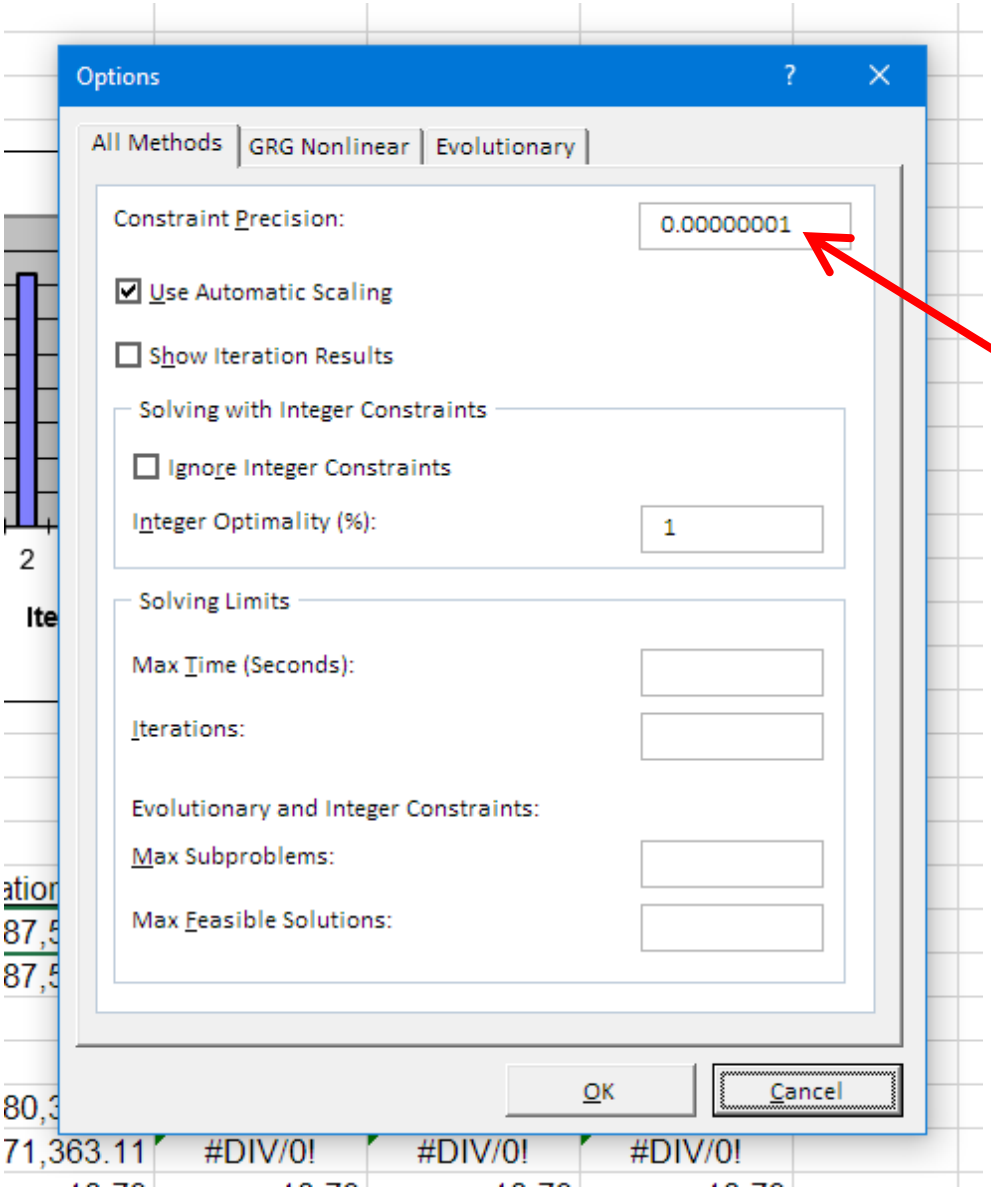

Use this precision value to get really close!

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Questions?