Data Analysis in Excel

Indhold

**** Analysis ToolPak,

https://www.excel-easy.com/data-analysis/analysis-toolpak.html

https://www.geeksforgeeks.org/data-analysis-in-excel/

chetanpahwa

- Read
- Discuss

Data Analysis with Excel is a detailed lesson that gives readers a clear understanding of the newest and most sophisticated functions offered by Microsoft Excel. It describes in detail how to use MS-capabilities Excel to carry out various data analysis tasks. The guide includes a good amount of screenshots that step-by-step demonstrate how to use various features. One of the most used programs for data analysis is Microsoft Excel. You can simply import, browse, clean, analyze, and display your data using this all-in-one data management tool.

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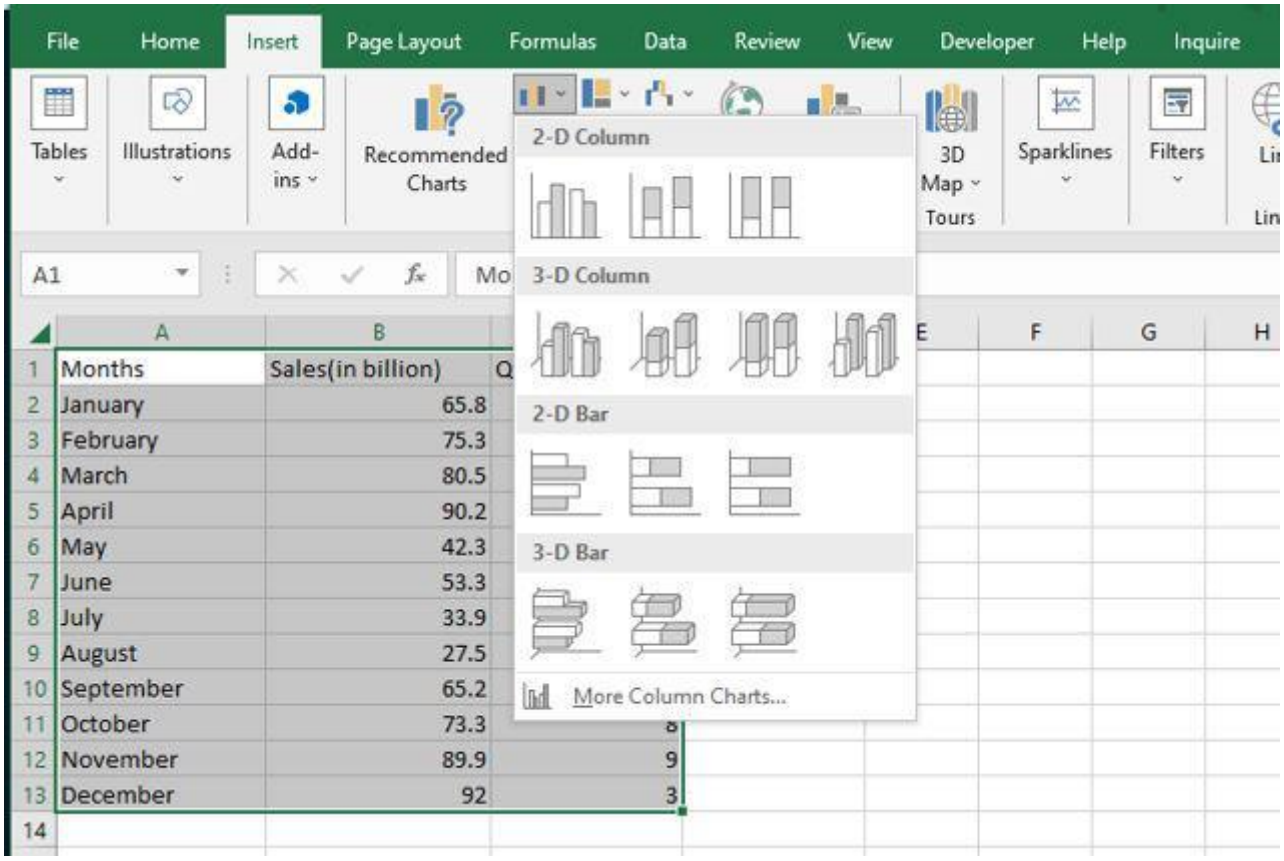
Types of Data Analysis

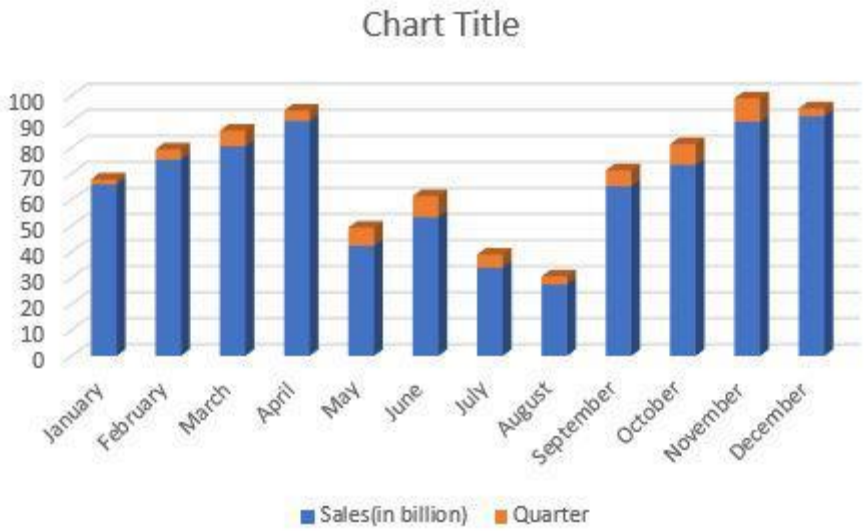
Charts

Any set of information may be graphically represented in a chart. A chart is a graphic representation of data that employs symbols to represent the data, such as bars in a bar chart or lines in a line chart. Excel has several different chart types available for you to choose from, or you can use the Excel Recommended Charts option to look at charts specifically made for your data and choose one of those.

Step 1: Select a **table.** After that go to the **Insert tab** on the top of the ribbon then in the **charts group select any chart.** Here we are going to **select a 3-D column chart.**



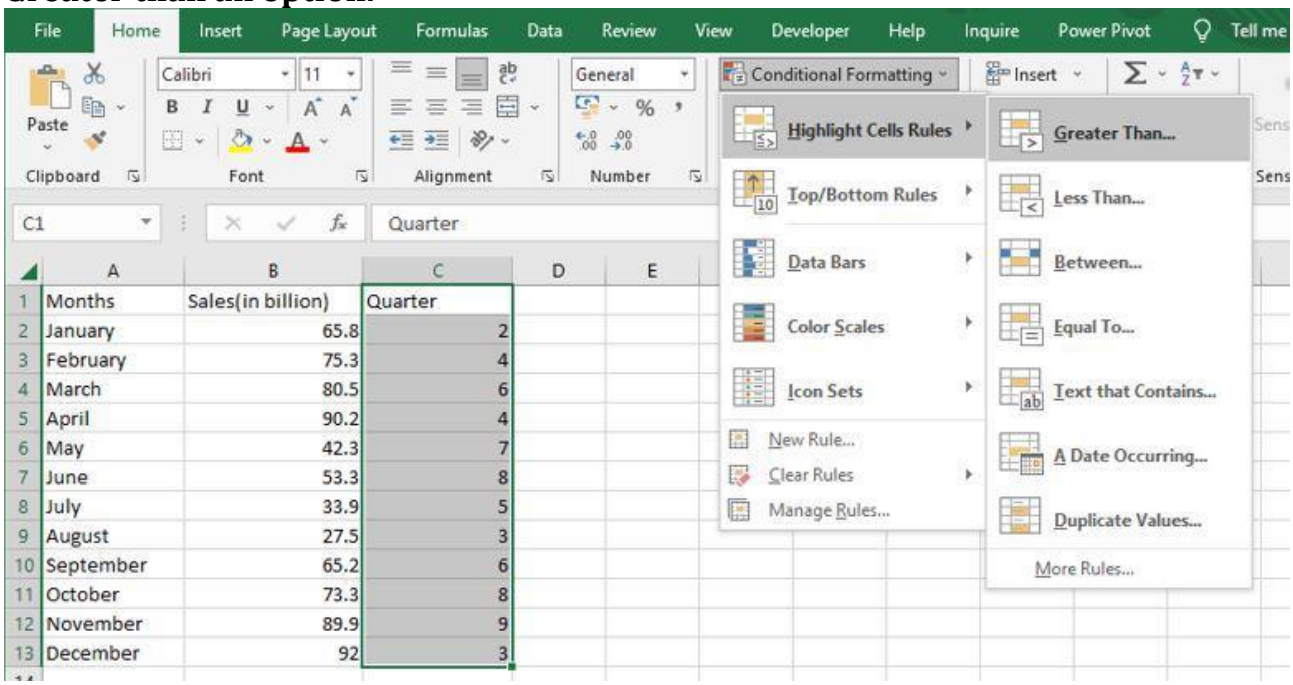
Step 2: As you can see, the excel **table has been converted to a 3-D column chart.**



Conditional Formatting

Patterns and trends in your data may be highlighted with the help of conditional formatting. To use it, write rules that determine the format of cells based on their values. In Excel for Windows, conditional formatting can be applied to a set of cells, an Excel table, and even a PivotTable report. To execute conditional formatting, adhere to the instructions listed below.

Step 1: Select any column from the table. Here we are going to **select a Quarter column.** After that go to the **home tab** on the top of the ribbon and then in the **styles group select conditional formatting** and then in the **highlight cells rule select Greater than an option.**



Step 2: Then a **greater than** dialog box appears. Here first **write the quarter value and then select the color.**

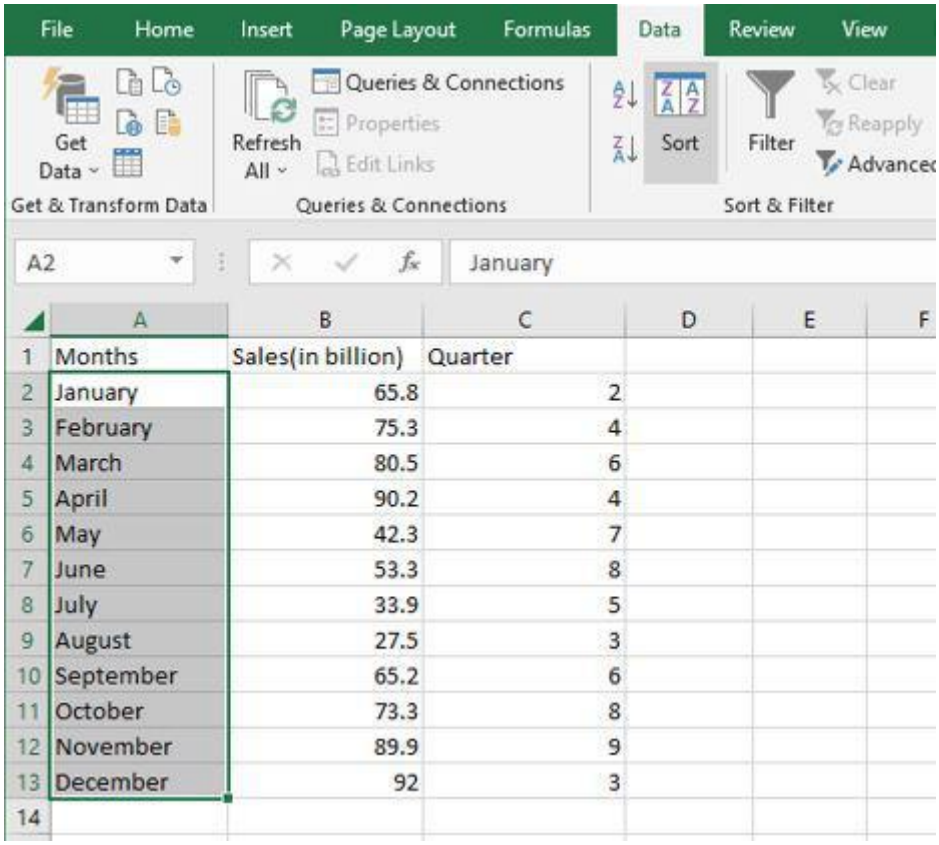
Step 3: As you can see in the excel table **Quarter column change the color of the values that are greater than 6.**

	A	B	C	D
1	Months	Sales(in billion)	Quarter	
2	January	65.8	2	
3	February	75.3	4	
4	March	80.5	6	
5	April	90.2	4	
6	May	42.3	7	
7	June	53.3	8	
8	July	33.9	5	
9	August	27.5	3	
10	September	65.2	6	
11	October	73.3	8	
12	November	89.9	9	
13	December	92	3	
14				
15				

Sorting

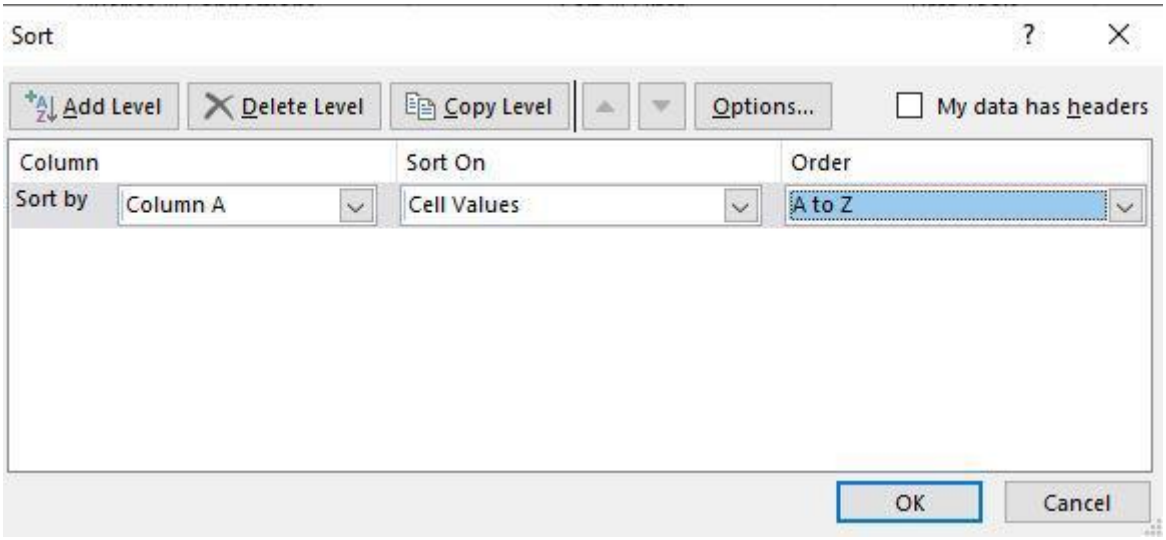
Data analysis requires sorting the data. A list of names may be arranged alphabetically, a list of sales numbers can be arranged from highest to lowest, or rows can be sorted by colors or icons. Sorting data makes it easier to immediately view and comprehend your data, organize and locate the facts you need, and ultimately help you make better decisions. Both columns and rows can be used to sort. You'll utilize column sorts for the majority of your sorting. By text, numbers, dates, and times, a custom list, format, including cell color, font color, or icon set, you may sort data in one or more columns.

Step 1: Select any column from the table. Here we are going to **select a Months column.** After that go to the **data tab** on the top of the ribbon and then in the **sort and filters group select sort.**



Step 2: Then a **sort dialog box** appears. Here first select **the column, then select sort on, and then Order.** After that click OK.

Duer ikke alle kolonner skal sorteres sammen



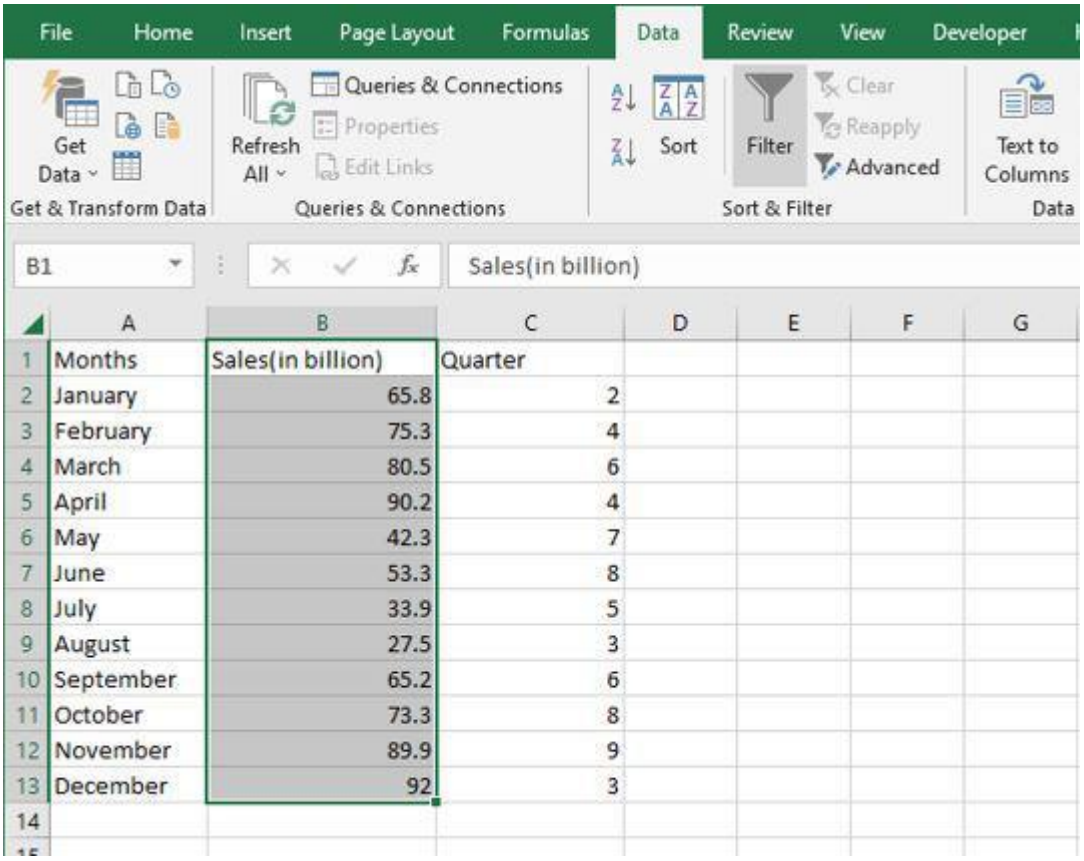
Step 3: Now as you can see the **months column is now arranged alphabetically.**

	A	B	C	D
1	Months	Sales(in billion)	Quarter	
2	April	65.8	2	
3	August	75.3	4	
4	December	80.5	6	
5	February	90.2	4	
6	January	42.3	7	
7	July	53.3	8	
8	June	33.9	5	
9	March	27.5	3	
10	May	65.2	6	
11	November	73.3	8	
12	October	89.9	9	
13	September	92	3	
14				
15				

Filter

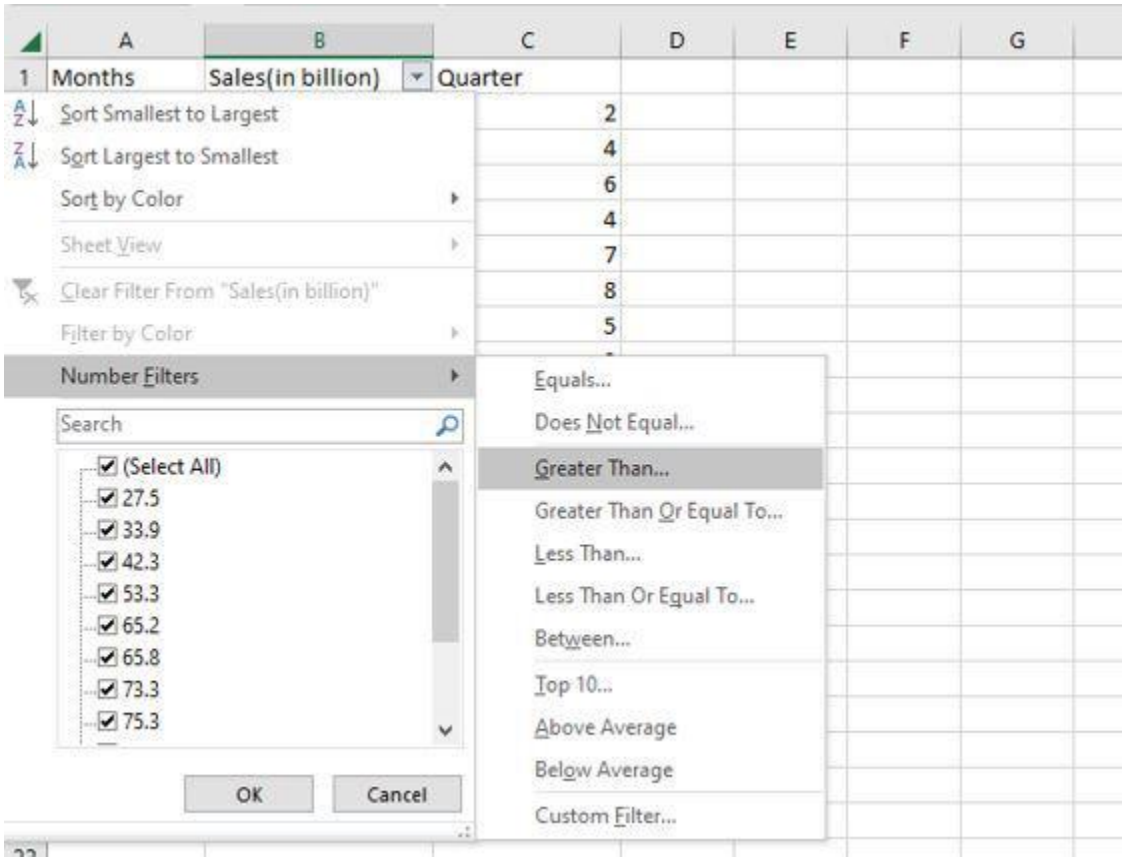
You may use filtering to pull information from a given Range or table that satisfies the specified criteria. This is a fast method of just showing the data you require. Data in a Range, table, or PivotTable may be filtered. You may use Selected Values to filter data. You may adjust your filtering options in the Custom AutoFilter dialogue box that displays when you click a Filter option or the Custom Filter link that is located at the end of the list of Filter options.

Step 1: Select any column from the table. Here we are going to **select a Sales column.** After that go to the **data tab** on the top of the ribbon and then in the **sort and filters group select filter.**

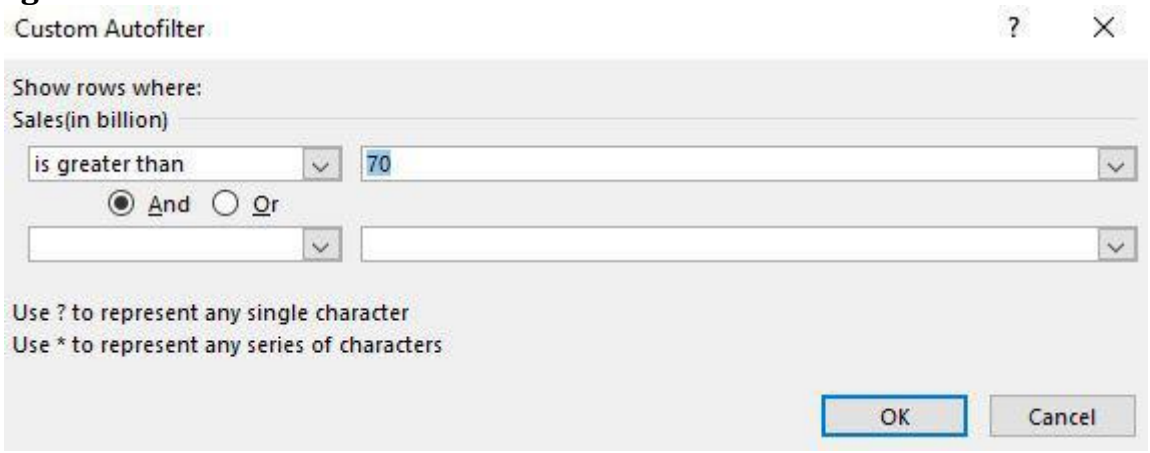


	A	B	C	D	E	F	G
1	Months	Sales(in billion)	Quarter				
2	January	65.8	2				
3	February	75.3	4				
4	March	80.5	6				
5	April	90.2	4				
6	May	42.3	7				
7	June	53.3	8				
8	July	33.9	5				
9	August	27.5	3				
10	September	65.2	6				
11	October	73.3	8				
12	November	89.9	9				
13	December	92	3				
14							

Step 2: The values in the sales column are then shown in a drop-down box. Here we are going to **select a number of filters and then greater than.**



Step 3: Then a **custom auto filler** dialog box appears. Here we are going to **apply sales greater than 70** and then click OK.



Step 4: Now as you can see **only the rows greater than 70** are shown.

	A	B	C	D
1	Months	Sales(in billion)	Quarter	
3	February	75.3	4	
4	March	80.5	6	
5	April	90.2	4	
11	October	73.3	8	
12	November	89.9	9	
13	December	92	3	
14				
15				
16				

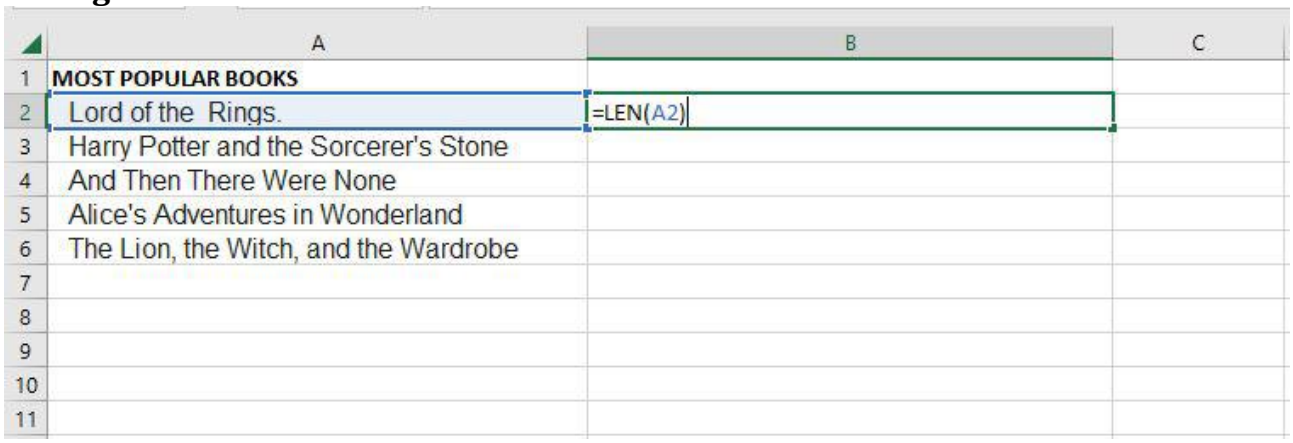
Method of Data Analysis

LEN quickly returns the character count in a given cell

=LEN quickly returns the character count in a given cell. The =LEN formula may be used to calculate the number of characters needed in a cell to distinguish between two different kinds of product Stock Keeping Units, as seen in the example above. When trying to discern between different Unique Identifiers, which might occasionally be lengthy and out of order, LEN is very crucial.

=LEN(Select Cell)

Step 1: If we want to see the **length of cell A2,** for that we need to **write the function of length.**



Step 2: Now as you can see it **shows the length of the cell A2.**

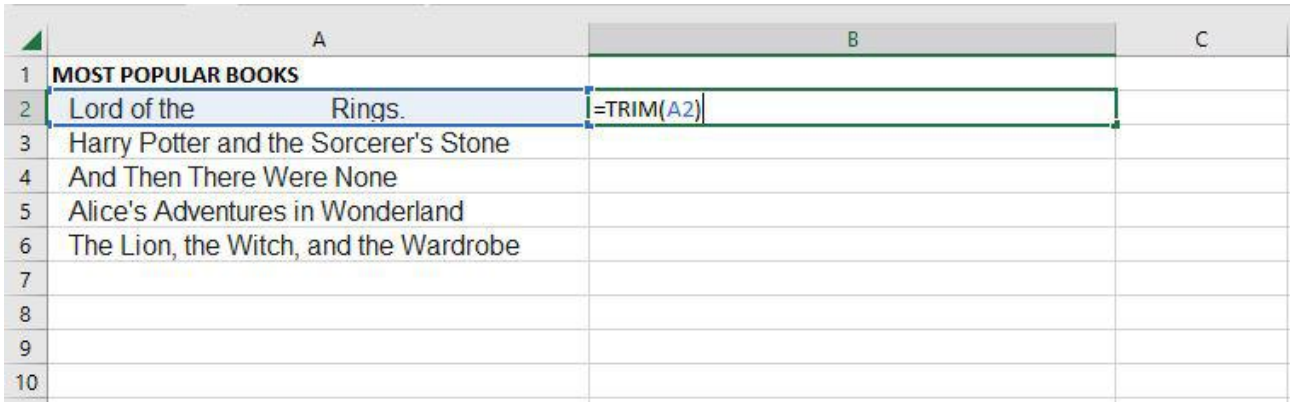
	A	B	C
1	MOST POPULAR BOOKS		
2	Lord of the Rings.	19	
3	Harry Potter and the Sorcerer's Stone		
4	And Then There Were None		
5	Alice's Adventures in Wonderland		
6	The Lion, the Witch, and the Wardrobe		
7			
8			
9			
10			

TRIM will remove all spaces from a cell

=TRIM function will remove all spaces from a cell, with the exception of single spaces between words. The most frequent application of this function is to get rid of trailing spaces. When content is copied verbatim from another source or when users insert spaces at the end of the text, this is normal.

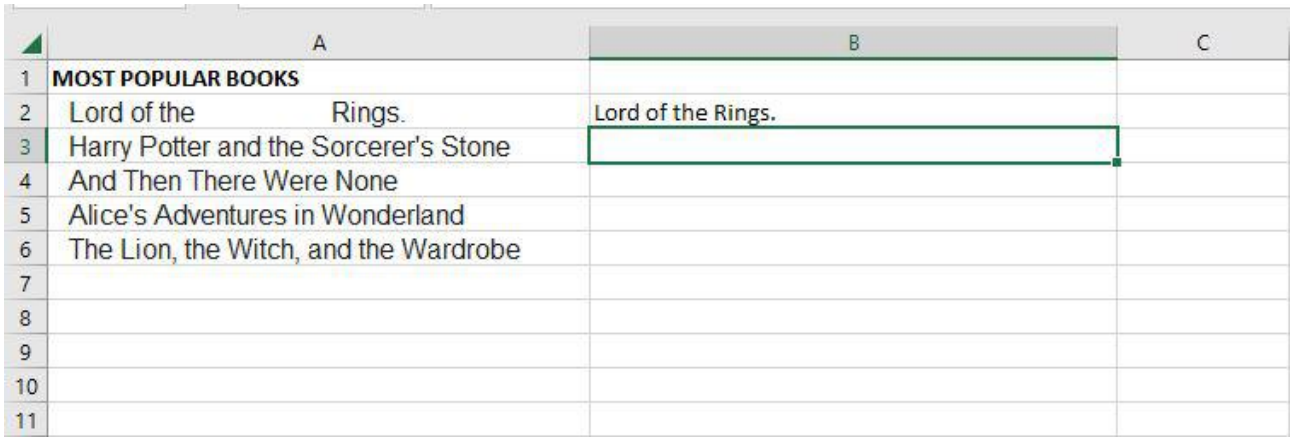
=TRIM(Select Cell)

Step 1: If we want to **remove all spaces from cell A2**, for that we need to write the function of trim.



	A	B	C
1	MOST POPULAR BOOKS		
2	Lord of the Rings.	=TRIM(A2)	
3	Harry Potter and the Sorcerer's Stone		
4	And Then There Were None		
5	Alice's Adventures in Wonderland		
6	The Lion, the Witch, and the Wardrobe		
7			
8			
9			
10			

Step 2: Now as you can see after **using the trim function, it removes all spaces.**



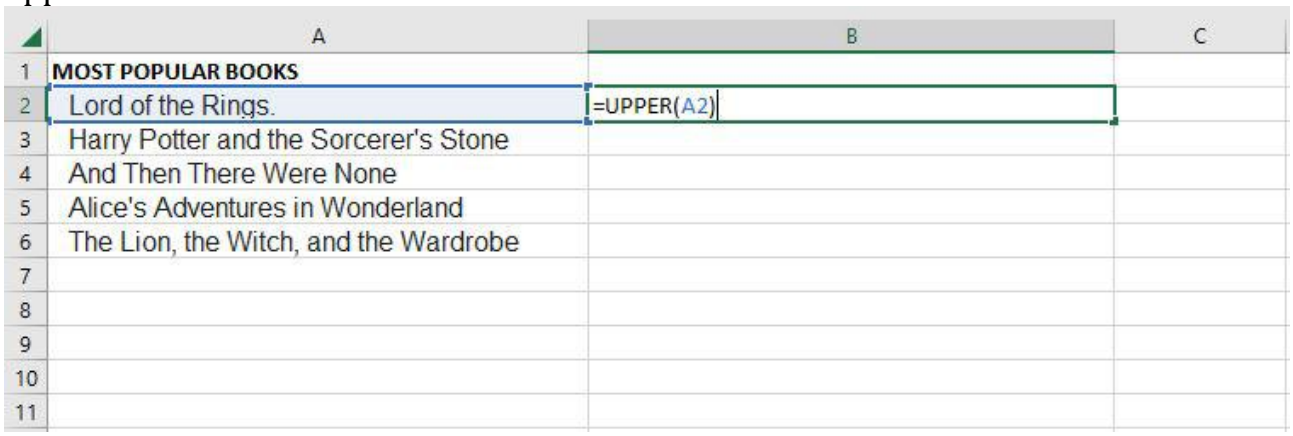
	A	B	C
1	MOST POPULAR BOOKS		
2	Lord of the Rings.	Lord of the Rings.	
3	Harry Potter and the Sorcerer's Stone		
4	And Then There Were None		
5	Alice's Adventures in Wonderland		
6	The Lion, the Witch, and the Wardrobe		
7			
8			
9			
10			
11			

UPPER

The Excel Text function "UPPER Function" will change the text to all capital letters (UPPERCASE). As a result, the function changes all of the characters in a text string input to upper case.

=UPPER(Text)

Text (mandatory parameter): This is the text that we wish to change to uppercase. Text can relate to a cell or be a text string.
Step 1: If we want to **convert the A2 cell to upper text,** for that we need to write the upper function.



	A	B	C
1	MOST POPULAR BOOKS		
2	Lord of the Rings.	=UPPER(A2)	
3	Harry Potter and the Sorcerer's Stone		
4	And Then There Were None		
5	Alice's Adventures in Wonderland		
6	The Lion, the Witch, and the Wardrobe		
7			
8			
9			
10			
11			

Step 2: Now as you can see after using the upper function, **the text is changed to the upper text.**

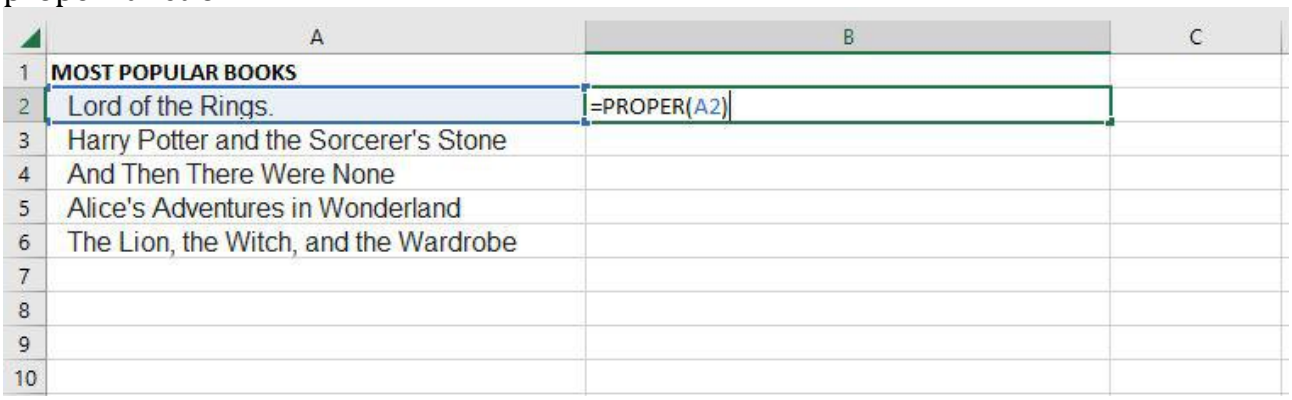
	A	B	C
1	MOST POPULAR BOOKS		
2	Lord of the Rings.	LORD OF THE RINGS.	
3	Harry Potter and the Sorcerer's Stone		
4	And Then There Were None		
5	Alice's Adventures in Wonderland		
6	The Lion, the Witch, and the Wardrobe		
7			
8			
9			
10			

PROPER

Under Excel Text functions, the PROPER Function is listed. Any subsequent letters of text that come after a character other than a letter will also be capitalized by PROPER.

=PROPER(Text)

Text (mandatory parameter): A formula that returns text, a cell reference, or text in quote marks must surround the text you wish to partly capitalize.
Step 1: If we want to **convert the A2 cell to proper text,** for that we need to write the proper function.



	A	B	C
1	MOST POPULAR BOOKS		
2	Lord of the Rings.	=PROPER(A2)	
3	Harry Potter and the Sorcerer's Stone		
4	And Then There Were None		
5	Alice's Adventures in Wonderland		
6	The Lion, the Witch, and the Wardrobe		
7			
8			
9			
10			

Step 2: Now as you can see after using the proper function, **the text is changed to the proper form.**

	A	B	C
1	**MOST POPULAR BOOKS**		
2	Lord of the Rings.	Lord Of The Rings.	
3	Harry Potter and the Sorcerer's Stone		
4	And Then There Were None		
5	Alice's Adventures in Wonderland		
6	The Lion, the Witch, and the Wardrobe		
7			
8			
9			
10			

The PROPER function changes the initial letter of every word, letters that follow digits, and other punctuation to uppercase. It could be where we least expect it. The characters for numbers and punctuation remain unaffected.

COUNTIF

Excel has a built-in function called COUNTIF that counts the given cells. The COUNTIF function can be used in both straightforward and sophisticated applications. The fundamental application of counting particular numbers and words is covered in this.

=COUNTIF(range,criteria)

- ***Range:*** *The size of the cell range to count.*
- ***Criteria:*** *The standards by which cells are selected for counting.*

Step 1: Use the **COUNTIF function on the range B2:B20** to get the number of regions we have of each type.

	A	B	C	D	E	F	G
1	Country	Region	Days				
2	Russia	East	1				
3	Russia	East	4				
4	Switzerland	West	1				
5	Switzerland	West	2			East	
6	Switzerland	West	1			West	
7	New Zealand	East	1			North	
8	New Zealand	East	1			South	
9	Canada	North	10			Northeast	
10	Canada	North	3				
11	Canada	North	7				
12	Canada	North	8				
13	UK	West	1				
14	UK	West	1				
15	GreenLand	North	1				
16	Peru	South	1				
17	Peru	South	2				
18	Nagaland	Northeast	1				
19	Brazil	South	1				
20	Kohima	Northeast	1				
21							

Step 2: The **COUNTIF function** will now be used to count the **different sorts of Regions in the range F5:F9.**

	A	B	C	D	E	F	G	H
1	Country	Region	Days					
2	Russia	East	1					
3	Russia	East	4					
4	Switzerland	West	1					
5	Switzerland	West	2			East	=COUNTIF(B2:B20,F5)	
6	Switzerland	West	1			West		
7	New Zealand	East	1			North		
8	New Zealand	East	1			South		
9	Canada	North	10			Northeast		
10	Canada	North	3					
11	Canada	North	7					
12	Canada	North	8					
13	UK	West	1					
14	UK	West	1					
15	GreenLand	North	1					
16	Peru	South	1					
17	Peru	South	2					
18	Nagaland	Northeast	1					
19	Brazil	South	1					
20	Kohima	Northeast	1					
21								

Step 3: Now as you can **see the 4 East Region has been correctly enumerated** using the COUNTIF function.

	A	B	C	D	E	F	G	H
1	Country	Region	Days					
2	Russia	East	1					
3	Russia	East	4					
4	Switzerland	West	1					
5	Switzerland	West	2			East	4	
6	Switzerland	West	1			West		
7	New Zealand	East	1			North		
8	New Zealand	East	1			South		
9	Canada	North	10			Northeast		
10	Canada	North	3					
11	Canada	North	7					
12	Canada	North	8					
13	UK	West	1					
14	UK	West	1					
15	GreenLand	North	1					
16	Peru	South	1					
17	Peru	South	2					
18	Nagaland	Northeast	1					
19	Brazil	South	1					
20	Kohima	Northeast	1					
21								

AVERAGEIF

An Excel built-in function called AVERAGEIF determines the average of a range depending on a true or false condition.

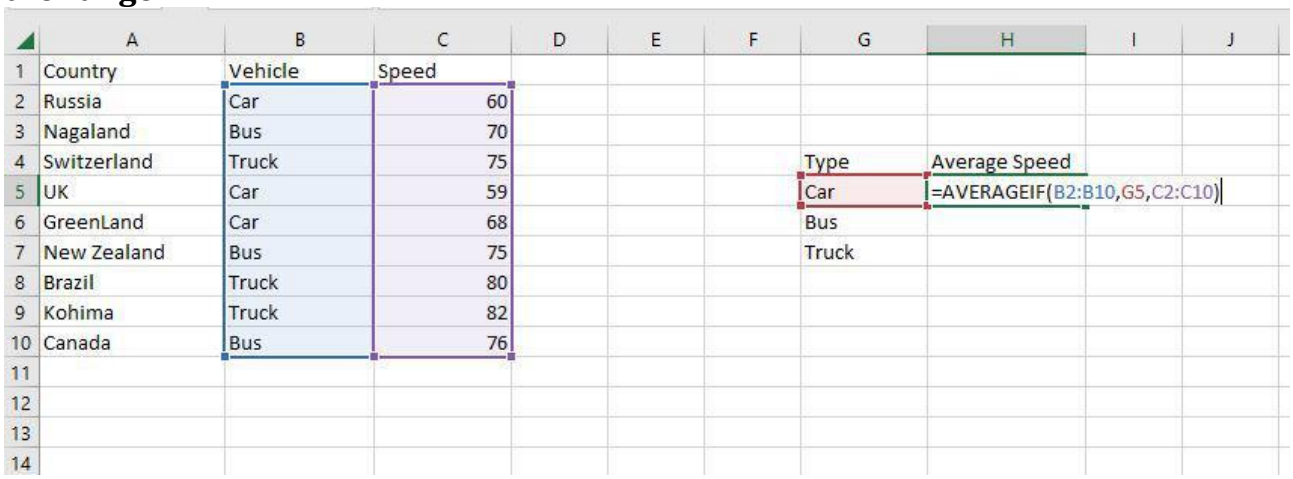
=AVERAGEIF(range, criteria, [average_range])

- ***Range:*** *The size of the cell range to count.*
- ***Criteria:*** *The standards by which cells are selected for counting.*
- ***Average Range:*** *The range in which the function computes the average is known as the average range. But the average range is not required.*

Step 1: Use the **AVERAGEIF function on the range B2:B10** to get the average speed of vehicles.

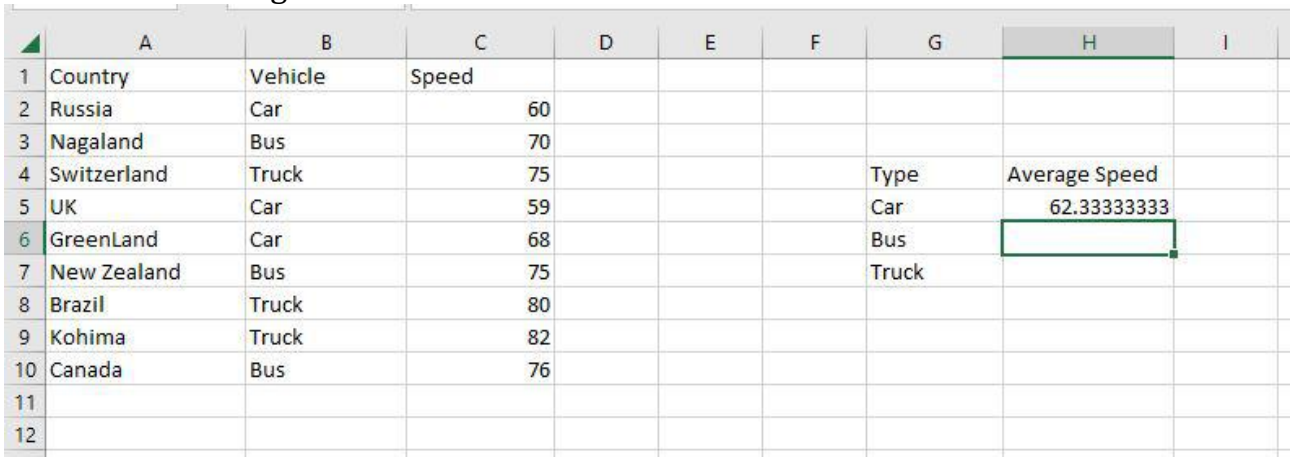
	A	B	C	D	E	F	G	H	I
1	Country	Vehicle	Speed						
2	Russia	Car	60						
3	Nagaland	Bus	70						
4	Switzerland	Truck	75				Type	Average Speed	
5	UK	Car	59				Car		
6	GreenLand	Car	68				Bus		
7	New Zealand	Bus	75				Truck		
8	Brazil	Truck	80						
9	Kohima	Truck	82						
10	Canada	Bus	76						
11									
12									
13									

Step 2: The AVERAGEIF function will now be used to find the **average of Vehicles in the range H4:H7.**



	A	B	C	D	E	F	G	H	I	J
1	Country	Vehicle	Speed							
2	Russia	Car	60							
3	Nagaland	Bus	70							
4	Switzerland	Truck	75				Type	Average Speed		
5	UK	Car	59				Car	=AVERAGEIF(B2:B10,G5,C2:C10)		
6	GreenLand	Car	68				Bus			
7	New Zealand	Bus	75				Truck			
8	Brazil	Truck	80							
9	Kohima	Truck	82							
10	Canada	Bus	76							
11										
12										
13										
14										

Step 3: Now as you can see the **62.333 Car average has been correctly enumerated** using the AVERAGEIF function.



	A	B	C	D	E	F	G	H	I
1	Country	Vehicle	Speed						
2	Russia	Car	60						
3	Nagaland	Bus	70						
4	Switzerland	Truck	75				Type	Average Speed	
5	UK	Car	59				Car	62.33333333	
6	GreenLand	Car	68				Bus		
7	New Zealand	Bus	75				Truck		
8	Brazil	Truck	80						
9	Kohima	Truck	82						
10	Canada	Bus	76						
11									
12									

SUMIF

A built-in Excel function called SUMIF determines if a condition is true or false before adding the values in a range.

=SUMIF(range, criteria, [sum_range])

- ***Range:*** *The size of the cell range to count.*
- ***Criteria:*** *The standards by which cells are selected for counting.*
- ***Sum Range:*** *The range that the function uses to calculate the total is known as the sum range.*

Step 1: Use the **SUMIF function on the range B2:B10** to get the sum of the vehicle's speed.

	A	B	C	D	E	F	G	H	I
1	Country	Vehicle	Speed						
2	Russia	Car	60						
3	Nagaland	Bus	70						
4	Switzerland	Truck	75				Type	Sum	
5	UK	Car	59				Car		
6	GreenLand	Car	68				Bus		
7	New Zealand	Bus	75				Truck		
8	Brazil	Truck	80						
9	Kohima	Truck	82						
10	Canada	Bus	76						
11									
12									
13									
14									

Step 2: The SUMIF function will now be used to **find the sum of Vehicles' speed in the range H4:H7.**

	A	B	C	D	E	F	G	H	I	J
1	Country	Vehicle	Speed							
2	Russia	Car	60							
3	Nagaland	Bus	70							
4	Switzerland	Truck	75				Type	Sum		
5	UK	Car	59				Car	=SUMIF(B2:B10,G5,C2:C10)		
6	GreenLand	Car	68				Bus			
7	New Zealand	Bus	75				Truck			
8	Brazil	Truck	80							
9	Kohima	Truck	82							
10	Canada	Bus	76							
11										
12										
13										

Step 3: Now as you can see the **187 Car sum has been correctly enumerated** using the SUMIF function.

	A	B	C	D	E	F	G	H	I
1	Country	Vehicle	Speed						
2	Russia	Car	60						
3	Nagaland	Bus	70						
4	Switzerland	Truck	75				Type	Sum	
5	UK	Car	59				Car	187	
6	GreenLand	Car	68				Bus		
7	New Zealand	Bus	75				Truck		
8	Brazil	Truck	80						
9	Kohima	Truck	82						
10	Canada	Bus	76						
11									

VLOOKUP, sammenlign

VLOOKUP is a built-in Excel function that permits searching across several columns.

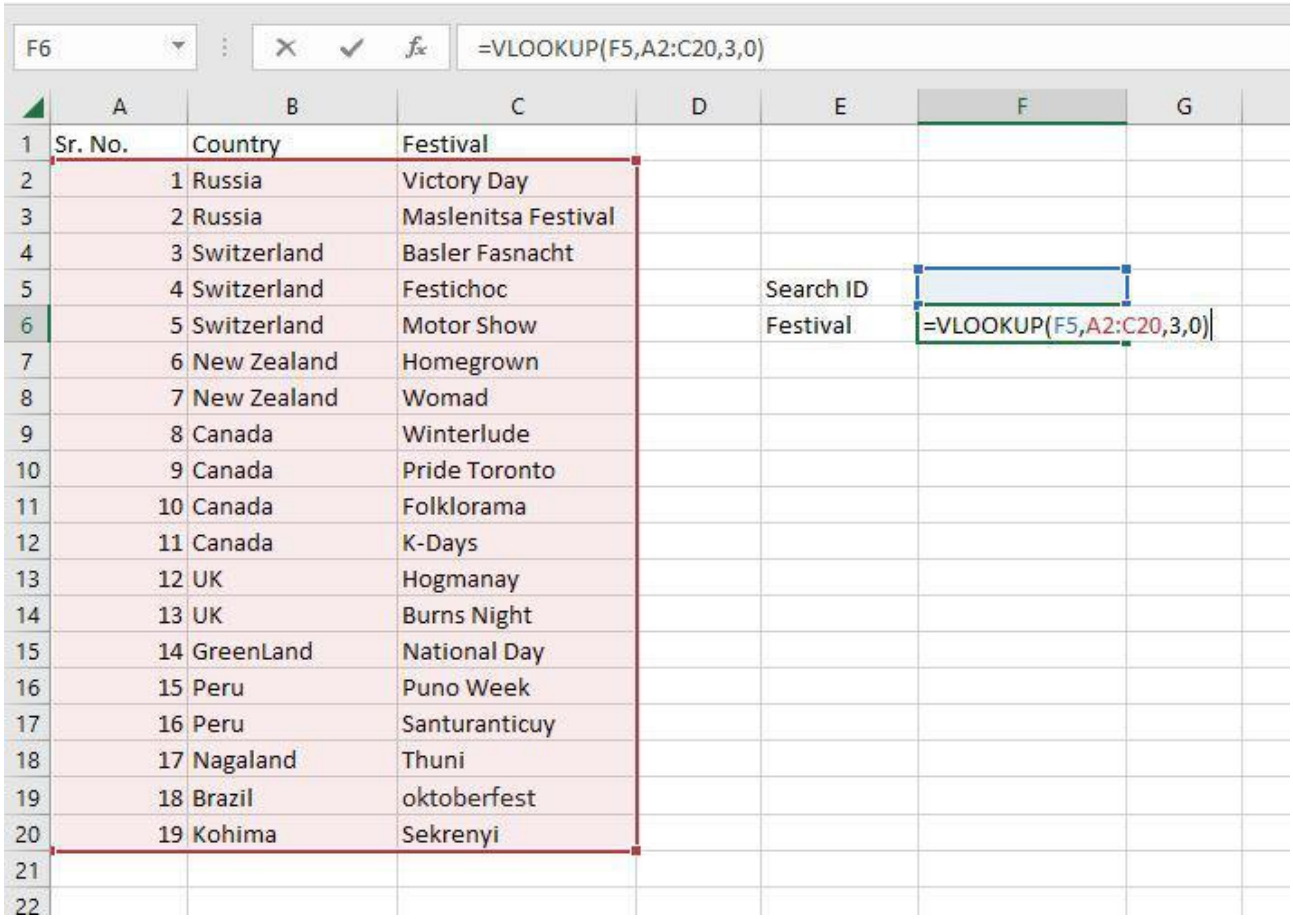
=VLOOKUP(lookup_value, table_array, col_index_num, [range_lookup])

- ***Lookup_value:*** *Choose the cell that will be used to input the search criteria.*
- ***Table_array:*** *The whole table range, which includes each and every cell.*
- ***Col_index_num:*** *The information being searched for. The column's number, starting from the left, is the input.*
- ***Range_lookup:*** *FALSE if text (0), TRUE if numbers (1).*

Step 1: To locate the **Festival names depending on their search ID, use the VLOOKUP function.** The Festival names in this instance are determined by their search ID.

	A	B	C	D	E	F	G
1	Sr. No.	Country	Festival				
2	1	Russia	Victory Day				
3	2	Russia	Maslenitsa Festival				
4	3	Switzerland	Basler Fasnacht				
5	4	Switzerland	Festichoc		Search ID		
6	5	Switzerland	Motor Show		Festival		
7	6	New Zealand	Homegrown				
8	7	New Zealand	Womad				
9	8	Canada	Winterlude				
10	9	Canada	Pride Toronto				
11	10	Canada	Folklorama				
12	11	Canada	K-Days				
13	12	UK	Hogmanay				
14	13	UK	Burns Night				
15	14	GreenLand	National Day				
16	15	Peru	Puno Week				
17	16	Peru	Santuranticuy				
18	17	Nagaland	Thuni				
19	18	Brazil	oktoberfest				
20	19	Kohima	Sekrenyi				
21							

Step 2: F5 was chosen as the lookup value. The search query is typed in this cell. Table array, in this case, **A2:C20, is designated as the table's range.** The **col index number is set to 3,** which is entered. The information being searched is in the third column from the left. **Range lookup is entered as 0 (False).**

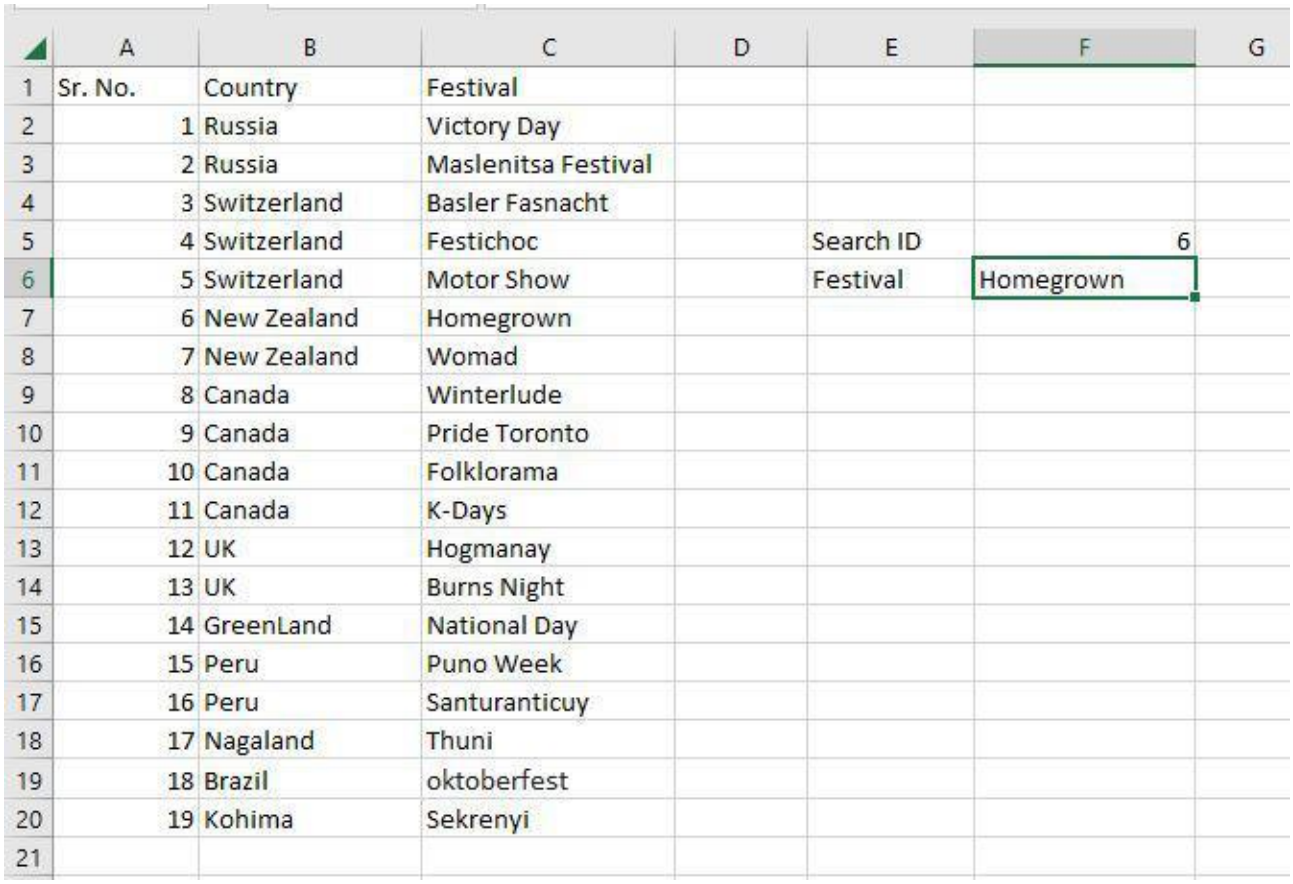


Sr. No.	Country	Festival
1	Russia	Victory Day
2	Russia	Maslenitsa Festival
3	Switzerland	Basler Fasnacht
4	Switzerland	Festichoc
5	Switzerland	Motor Show
6	New Zealand	Homegrown
7	New Zealand	Womad
8	Canada	Winterlude
9	Canada	Pride Toronto
10	Canada	Folklorama
11	Canada	K-Days
12	UK	Hogmanay
13	UK	Burns Night
14	GreenLand	National Day
15	Peru	Puno Week
16	Peru	Santuranticuy
17	Nagaland	Thuni
18	Brazil	oktoberfest
19	Kohima	Sekrenyi

Step 3: The **#N/A value is what the function returns.** This is the result of the Search ID F5 having no value entered.

	A	B	C	D	E	F	G
1	Sr. No.	Country	Festival				
2	1	Russia	Victory Day				
3	2	Russia	Maslenitsa Festival				
4	3	Switzerland	Basler Fasnacht				
5	4	Switzerland	Festichoc		Search ID		
6	5	Switzerland	Motor Show		Festival	#N/A	
7	6	New Zealand	Homegrown				
8	7	New Zealand	Womad				
9	8	Canada	Winterlude				
10	9	Canada	Pride Toronto				
11	10	Canada	Folklorama				
12	11	Canada	K-Days				
13	12	UK	Hogmanay				
14	13	UK	Burns Night				
15	14	GreenLand	National Day				
16	15	Peru	Puno Week				
17	16	Peru	Santuranticuy				
18	17	Nagaland	Thuni				
19	18	Brazil	oktoberfest				
20	19	Kohima	Sekrenyi				
21							

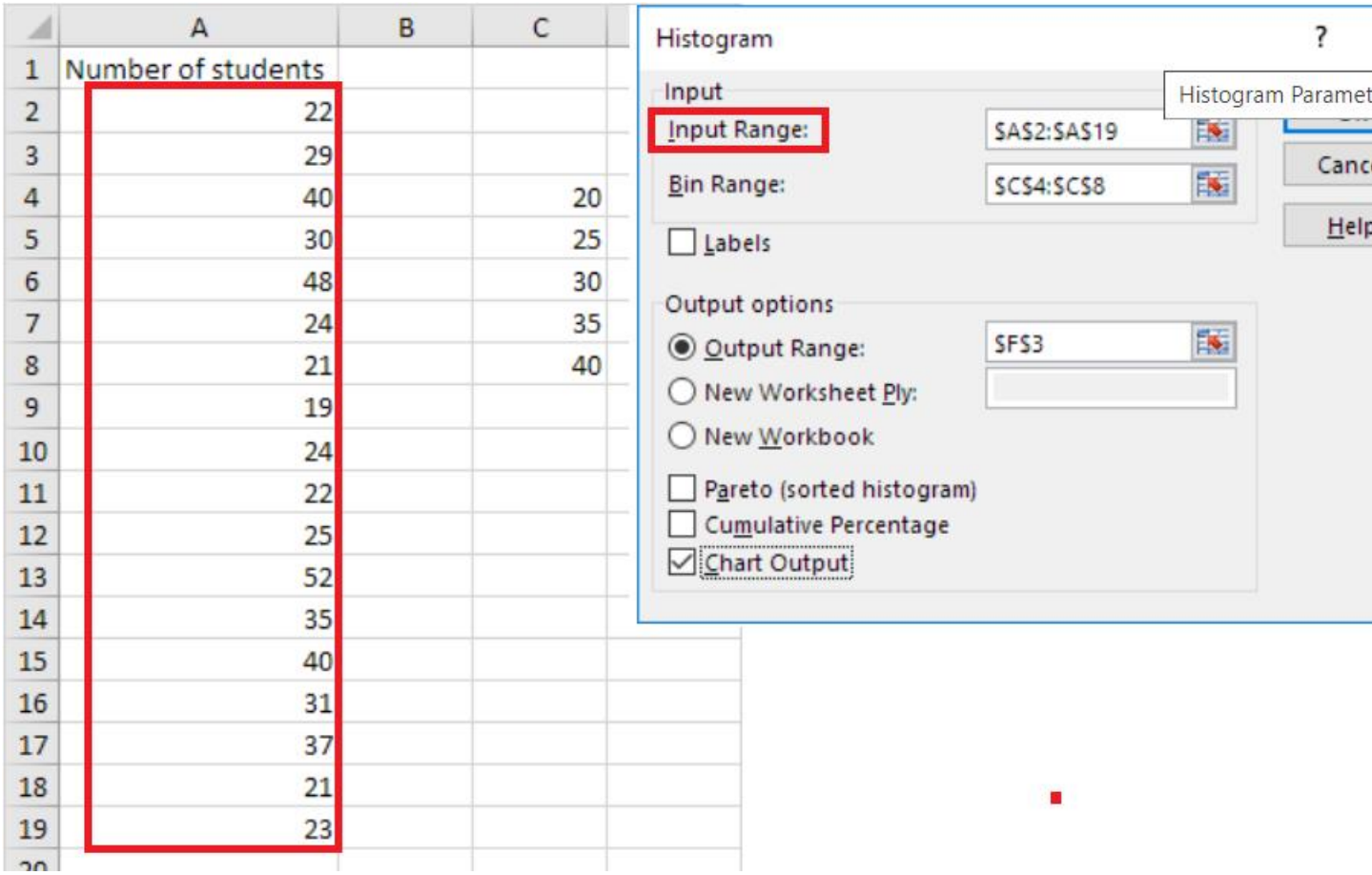
Step 4: The **Homegrown Festival**, which has **Search ID 6, has been located through the VLOOKUP tool.**



	A	B	C	D	E	F	G
1	Sr. No.	Country	Festival				
2	1	Russia	Victory Day				
3	2	Russia	Maslenitsa Festival				
4	3	Switzerland	Basler Fasnacht				
5	4	Switzerland	Festichoc		Search ID	6	
6	5	Switzerland	Motor Show		Festival	Homegrown	
7	6	New Zealand	Homegrown				
8	7	New Zealand	Womad				
9	8	Canada	Winterlude				
10	9	Canada	Pride Toronto				
11	10	Canada	Folklorama				
12	11	Canada	K-Days				
13	12	UK	Hogmanay				
14	13	UK	Burns Night				
15	14	GreenLand	National Day				
16	15	Peru	Puno Week				
17	16	Peru	Santuranticuy				
18	17	Nagaland	Thuni				
19	18	Brazil	oktoberfest				
20	19	Kohima	Sekrenyi				
21							

Histogram med Data/Dataanalyse

This example teaches you how to make a histogram in Excel.



9. Click the legend on the right side and press Delete.

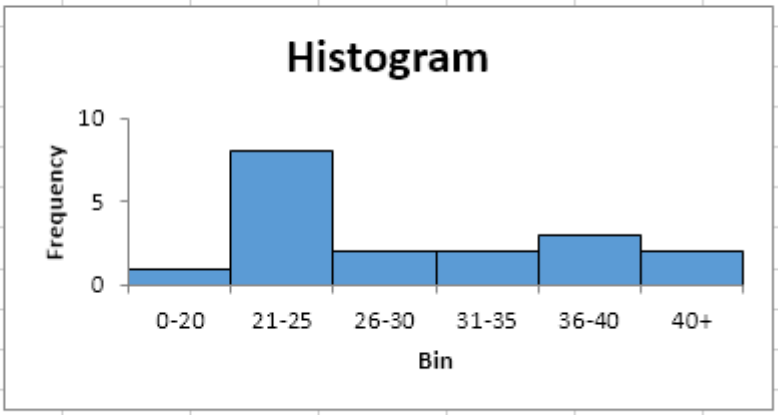
10. Properly label your bins.

11. To remove the space between the bars, right click a bar, click Format Data Series and change the Gap Width to 0%.

12. To add borders, right click a bar, click Format Data Series, click the Fill & Line icon, click Border and select a color.

Result:

Bin	Frequency
0-20	1
21-25	8
26-30	2
31-35	2
36-40	3
40+	2

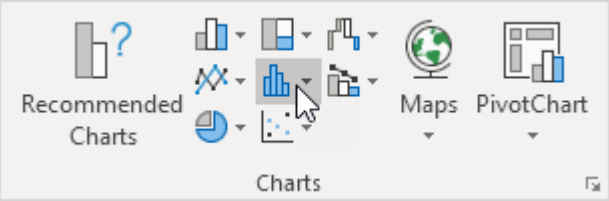


If you have Excel 2016 or later, simply use the Histogram chart type.

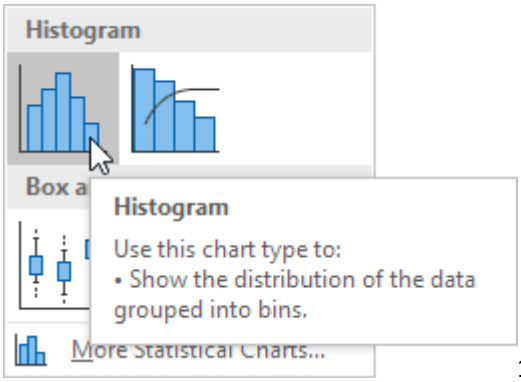
13. Select the range A1:A19.

	A	B
1	Number of students	
2	22	
3	29	
4	40	
5	30	
6	48	
7	24	
8	21	
9	19	
10	24	
11	22	
12	25	
13	52	
14	35	
15	40	
16	31	
17	37	
18	21	
19	23	
20		

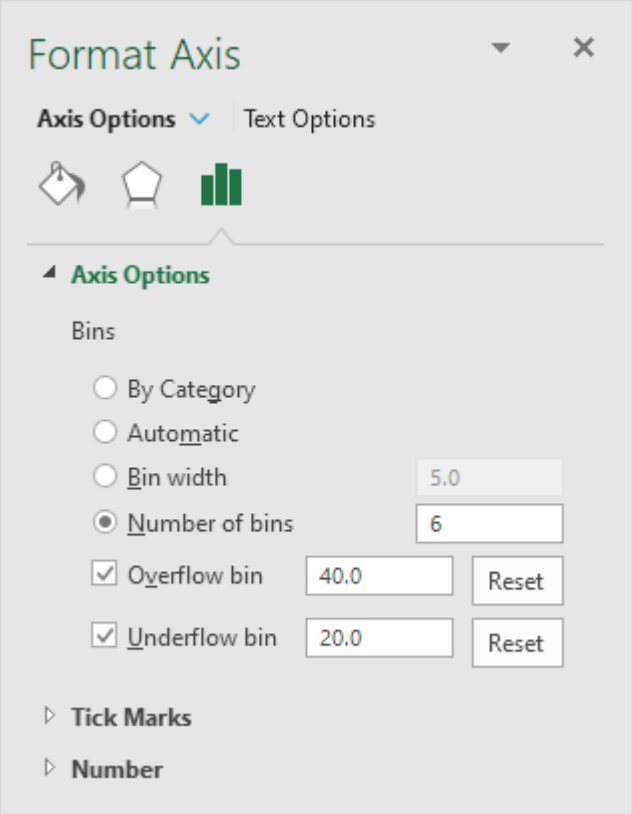
14. On the Insert tab, in the Charts group, click the Histogram symbol.



15. Click Histogram.



17. Define the histogram bins. We'll use the same bin numbers as before (see first picture on this page). Bin width: 5. Number of bins: 6. Overflow bin: 40. Underflow bin: 20.



Pareto Chart : viser ca 80% effekterne kommer fra 20% årsagerne

https://www.excel-easy.com/examples/pareto-chart.html

pareto-chart.xlsx

This example teaches you how to create a Pareto chart in Excel. The Pareto principle states that, for many events, roughly 80% of the effects come from 20% of the causes. In this example, we will see that roughly 80% of the complaints come from 20% of the complaint types.

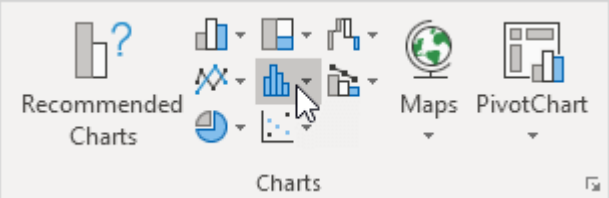
Excel 2016 or later

To create a Pareto chart in Excel 2016 or later, execute the following steps.

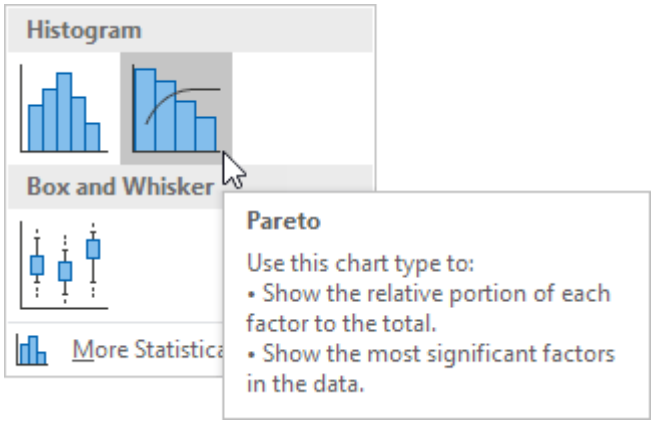
1. Select the range A3:B13.

	A	B	C
1	Restaurant Complaints		
2			
3	**Complaint Type**	**Count**	
4	Too noisy	27	
5	Overpriced	789	
6	Food is tasteless	65	
7	Food not fresh	9	
8	Food is too salty	15	
9	Not clean	30	
10	Unfriendly staff	12	
11	Wait time	109	
12	No atmosphere	45	
13	Small portions	621	
14			

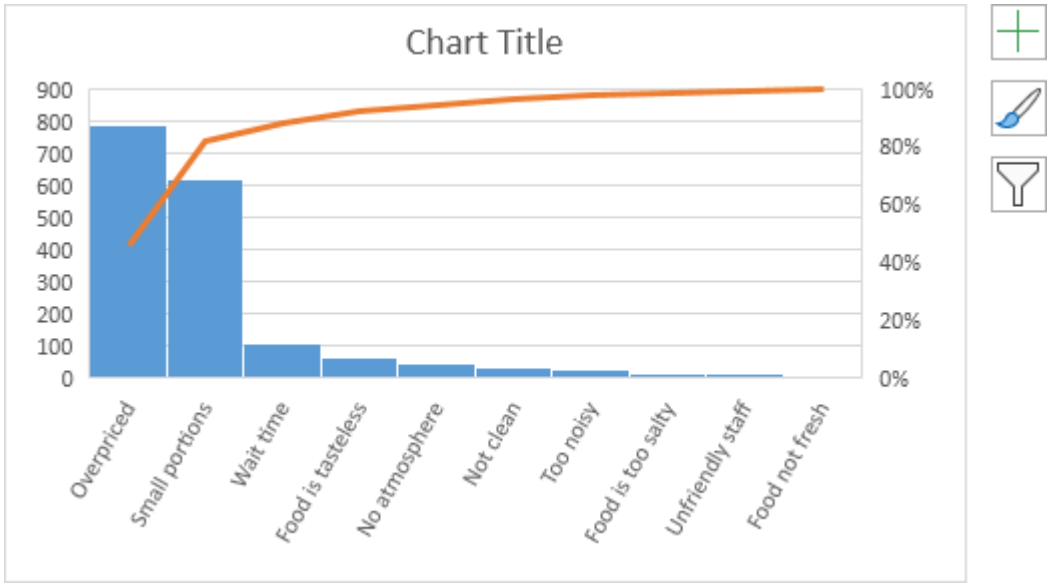
2. On the Insert tab, in the Charts group, click the Histogram symbol.



3. Click Pareto.



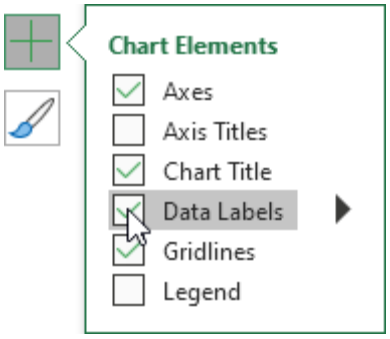
Result:



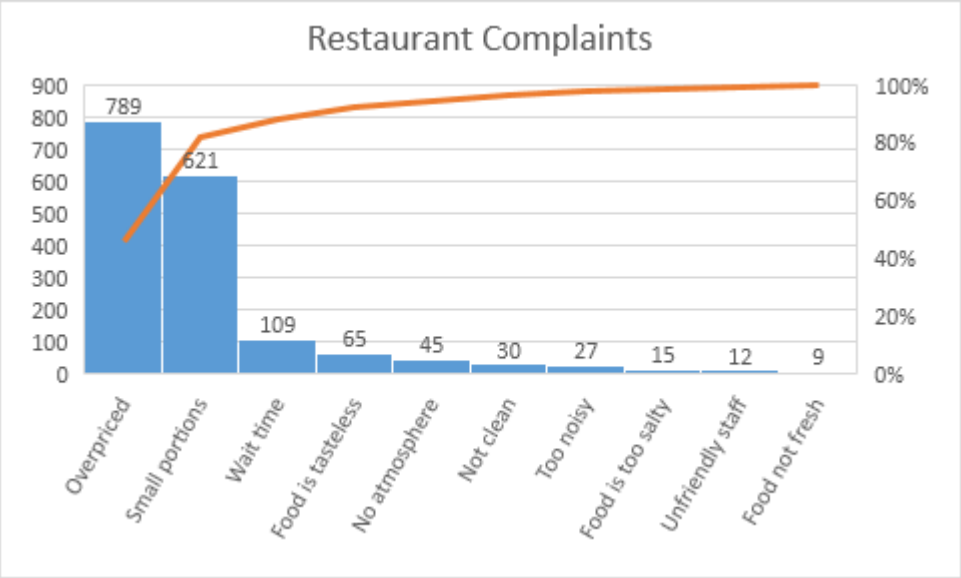
Note: a Pareto chart combines a column chart and a line graph.

4. Enter a chart title.

5. Click the + button on the right side of the chart and click the check box next to Data Labels.

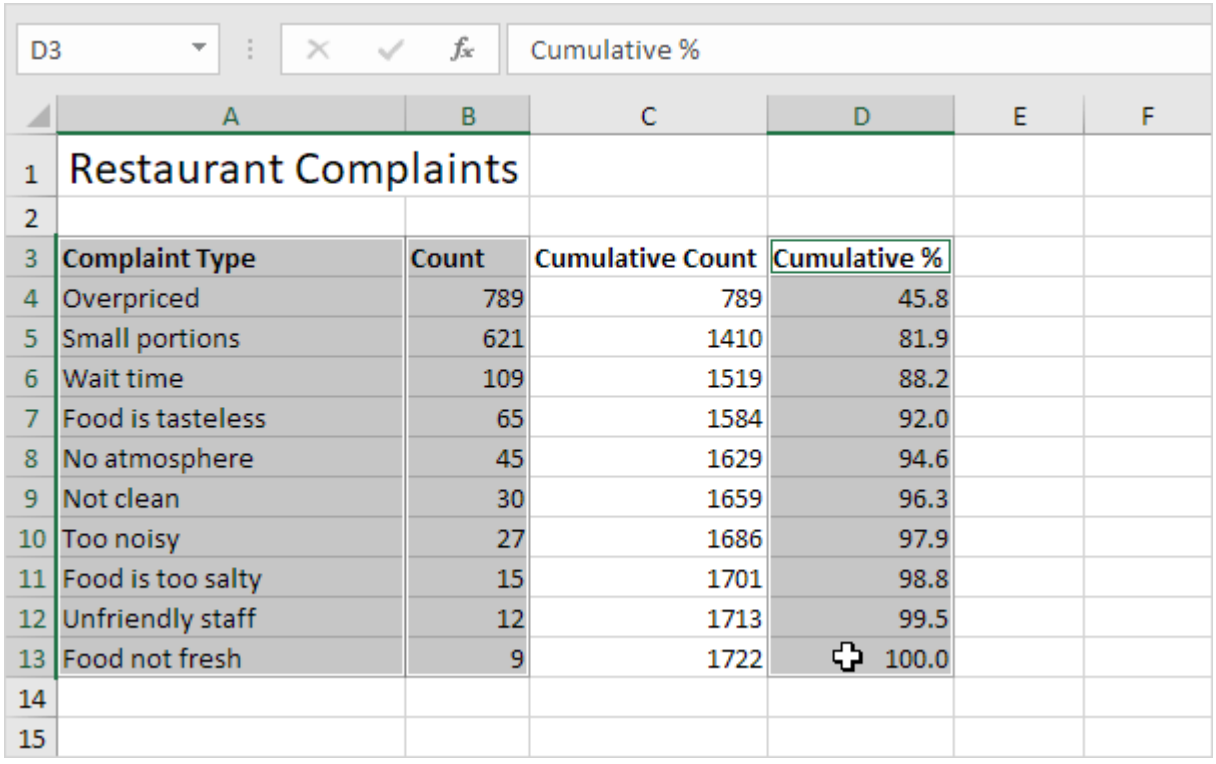


Result:

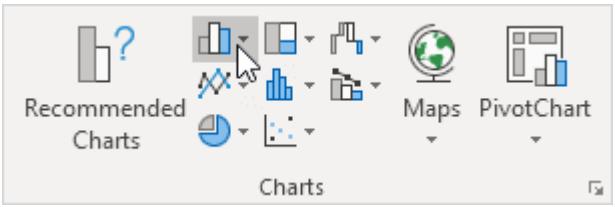


Conclusion: the orange Pareto line shows that (789 + 621) / 1722 ≈ 80% of the complaints come from 2 out of 10 = 20% of the complaint types (Overpriced and Small portions). In other words: the Pareto principle applies.

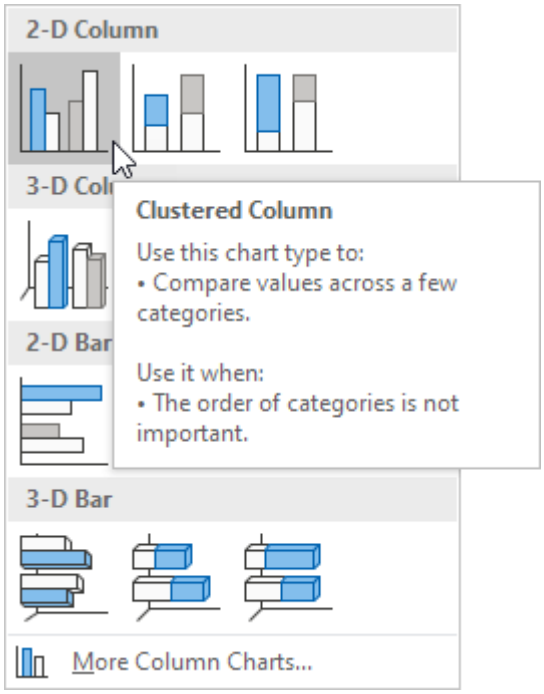
Old excels-versions



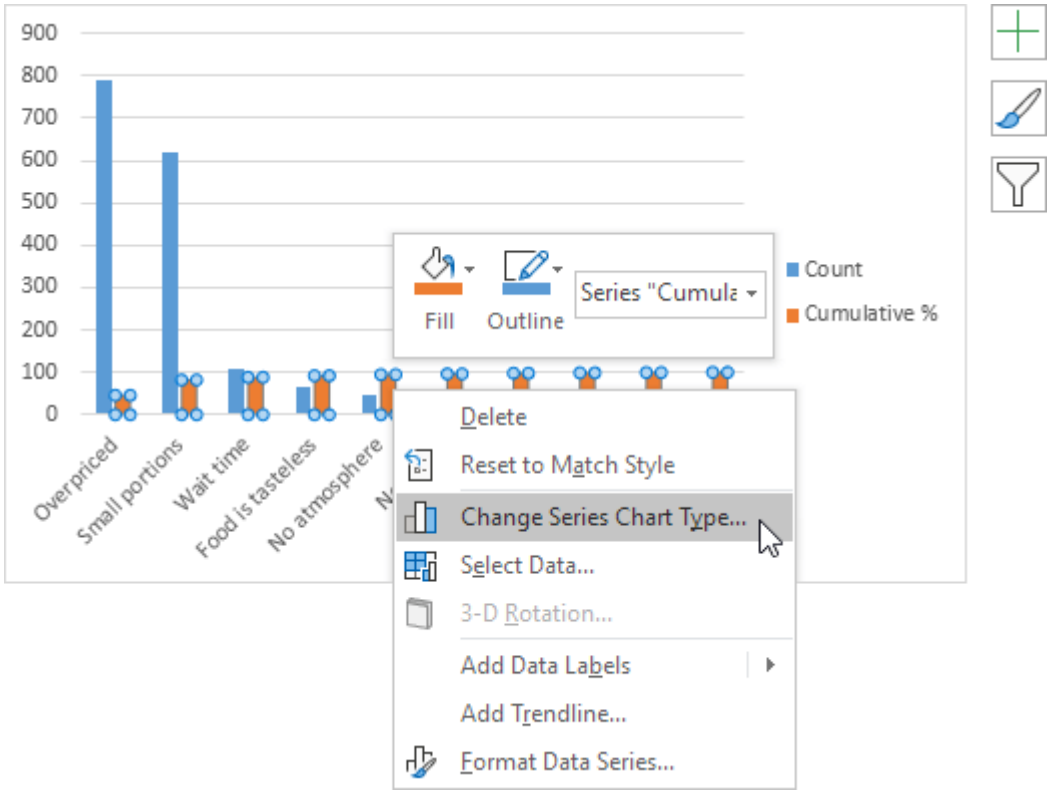
6. On the Insert tab, in the Charts group, click the Column symbol.



7. Click Clustered Column.



8. Right click on the orange bars (Cumulative %) and click Change Series Chart Type...

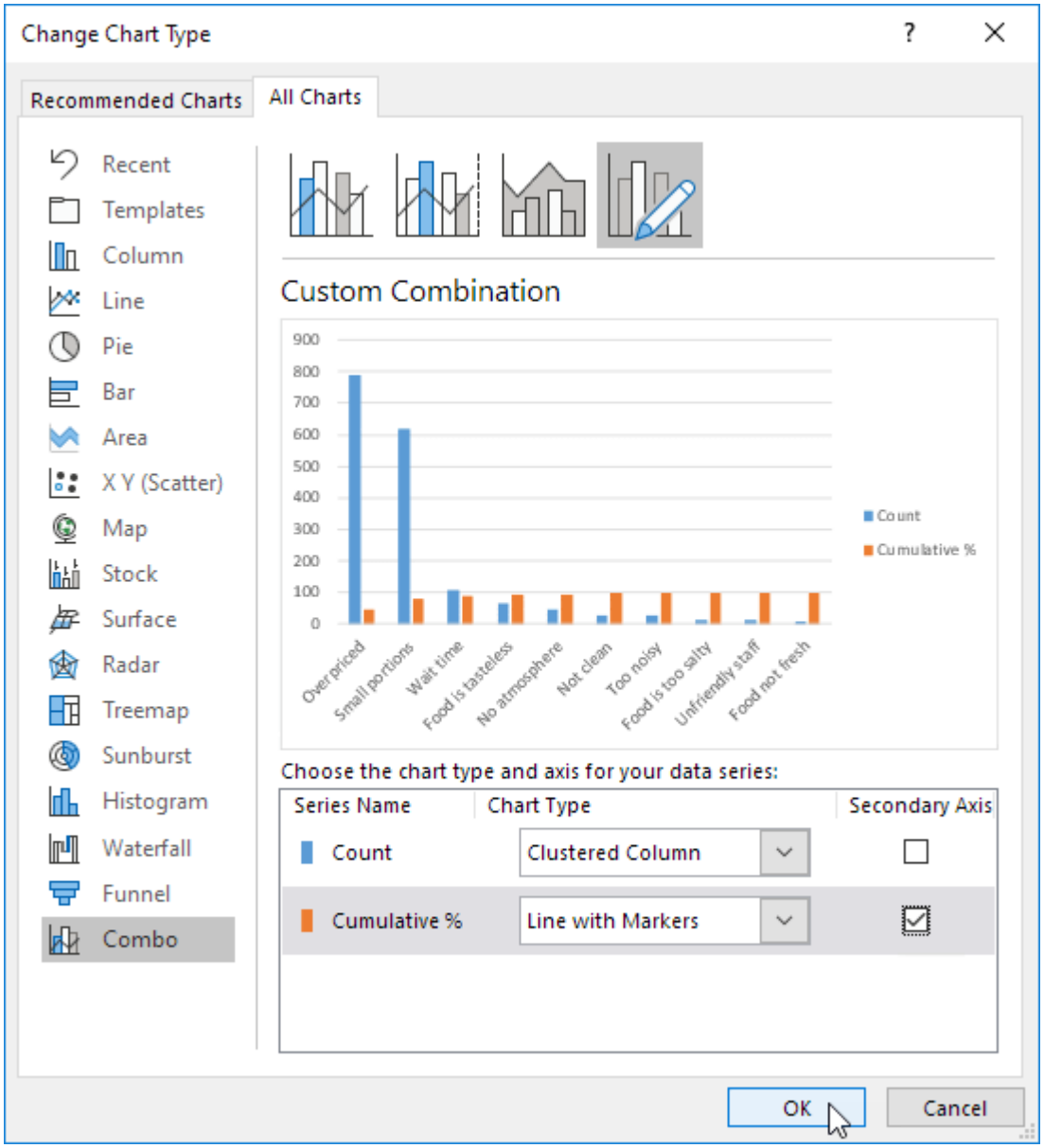


The Change Chart Type dialog box appears.

9. For the Cumulative % series, choose Line with Markers as the chart type.

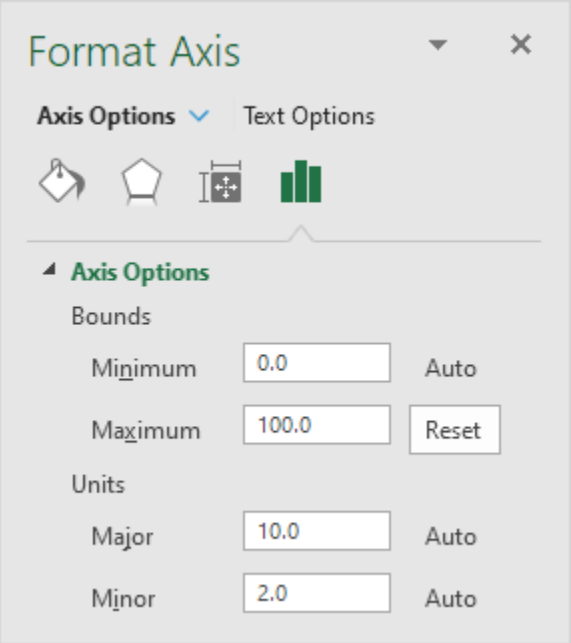
10. Plot the Cumulative % series on the secondary axis.

11. Click OK.

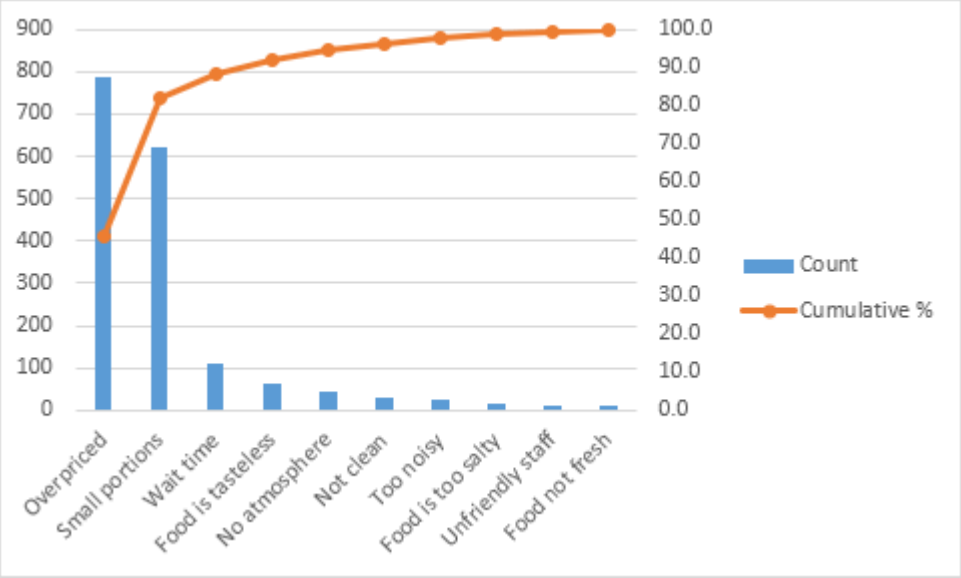


Note: Excel 2010 does not offer combo chart as one of the built-in chart types. If you're using Excel 2010, instead of executing steps 8-10, simply select Line with Markers and click OK. Next, right click on the orange/red line and click Format Data Series. Select Secondary Axis and click Close.

12. Right click the percentages on the chart, click Format Axis and set the Maximum to 100.



Result:



Conclusion: the Pareto chart shows that 80% of the complaints come from 20% of the complaint types (Overpriced and Small portions). In other words: the Pareto principle applies.

17/17 Completed! Learn much more about charts >
Go to Next Chapter: Pivot Tables

Gantt Chart :project-delopgaver over tidsperiode

gantt-chart

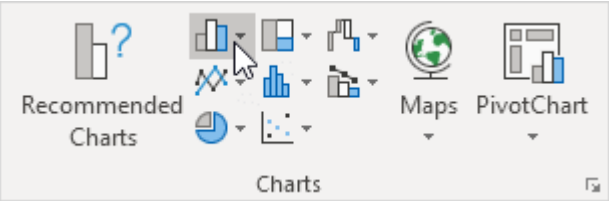
Excel does not offer Gantt as a chart type, but it's easy to create a Gantt chart by customizing the stacked bar chart type. Below you can find our Gantt chart data.

	A	B	C	D
1	Build a House			
2				
3		**Start Date**	**Duration**	
4	Foundation	1-Jun	10	
5	Walls	12-Jun	7	
6	Roof	20-Jun	10	
7	Windows, Doors	1-Jul	5	
8	Plumbing	7-Jul	3	
9	Electric	7-Jul	3	
10	Painting	11-Jul	2	
11	Flooring	13-Jul	2	
12				

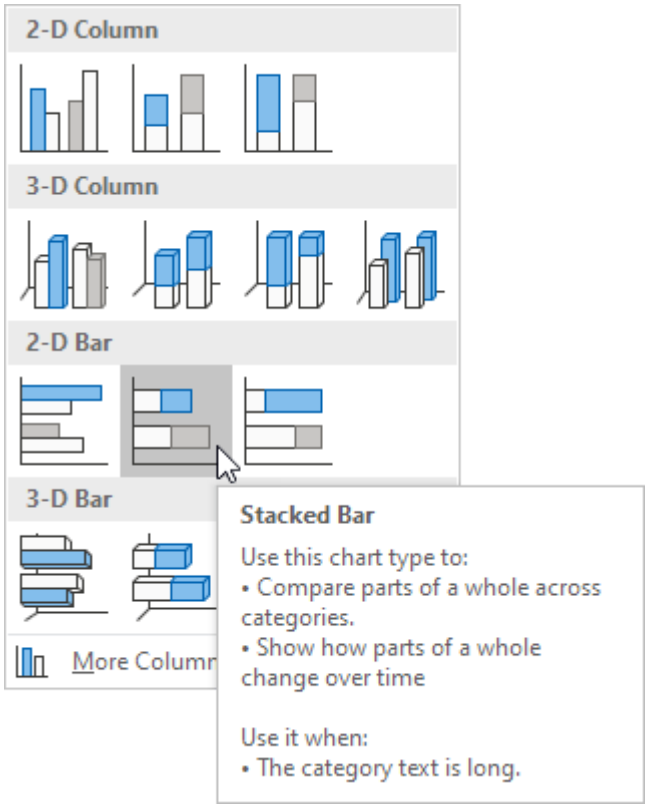
To create a Gantt chart, execute the following steps.

1. Select the range A3:C11.

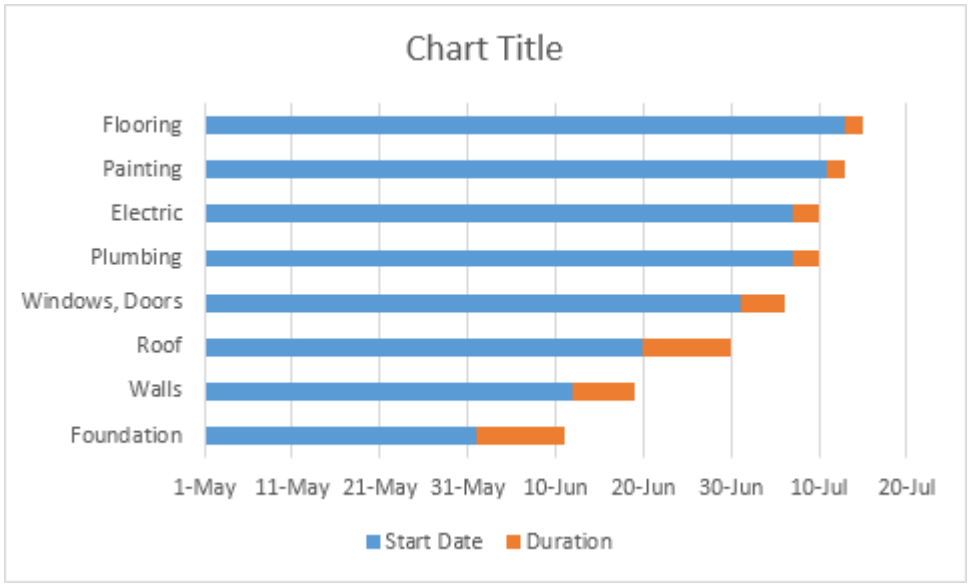
2. On the Insert tab, in the Charts group, click the Column symbol.



3. Click Stacked Bar.



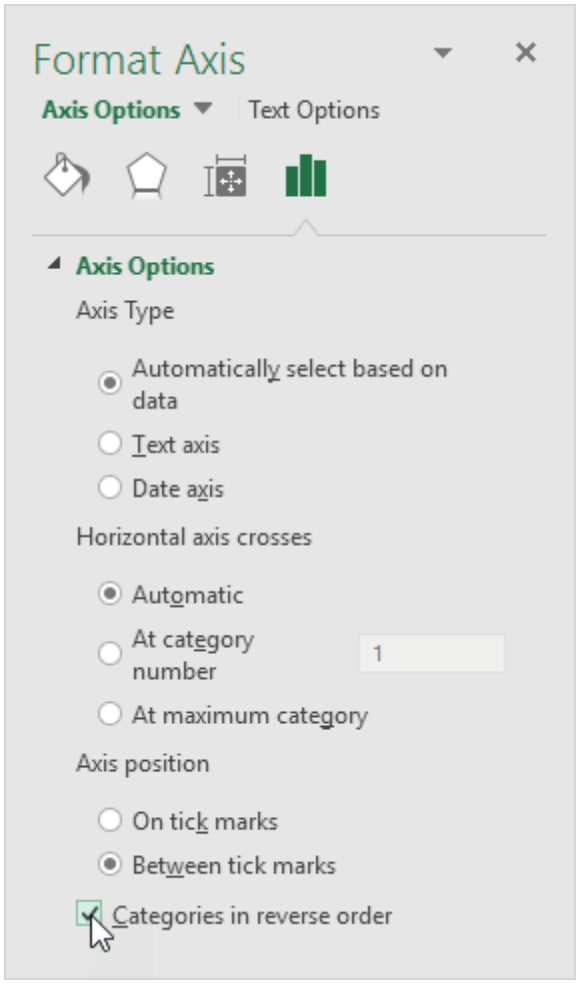
Result:



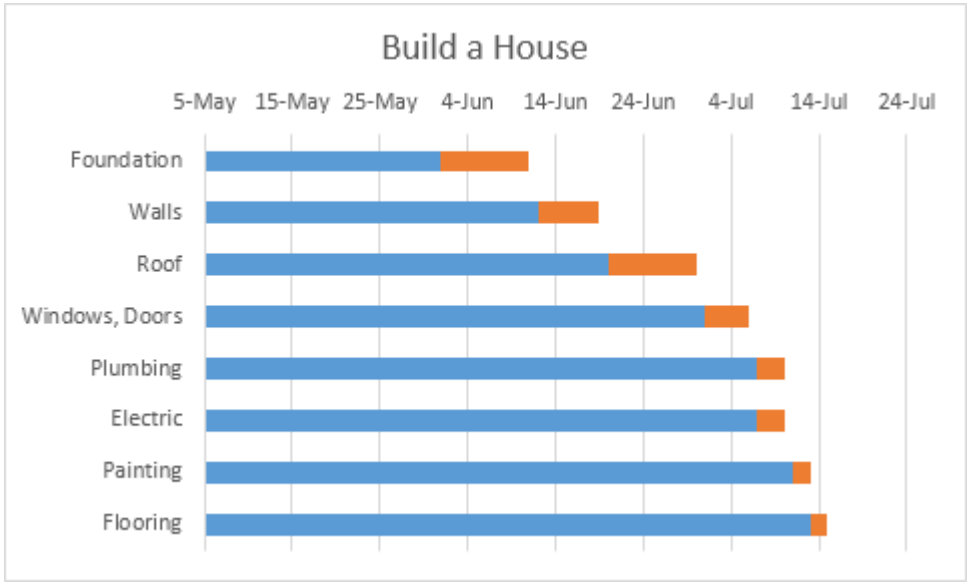
4. Enter a title by clicking on Chart Title. For example, Build a House.

5. Click the legend at the bottom and press Delete.

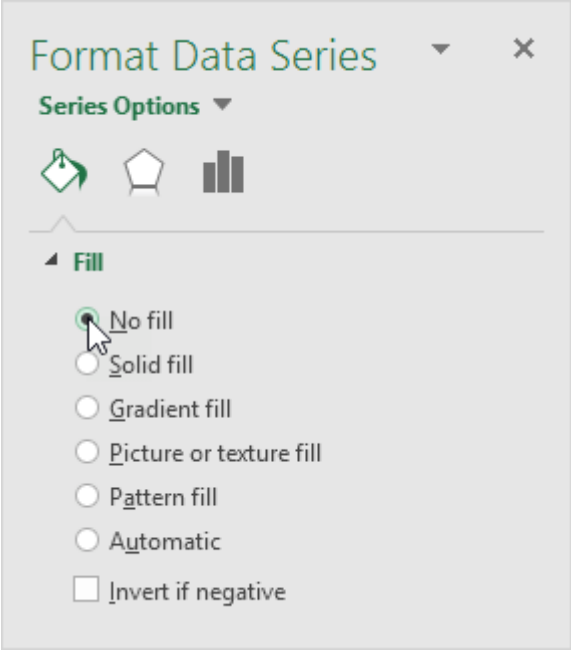
6. The tasks (Foundation, Walls, etc.) are in reverse order. Right click the tasks on the chart, click Format Axis and check 'Categories in reverse order'.



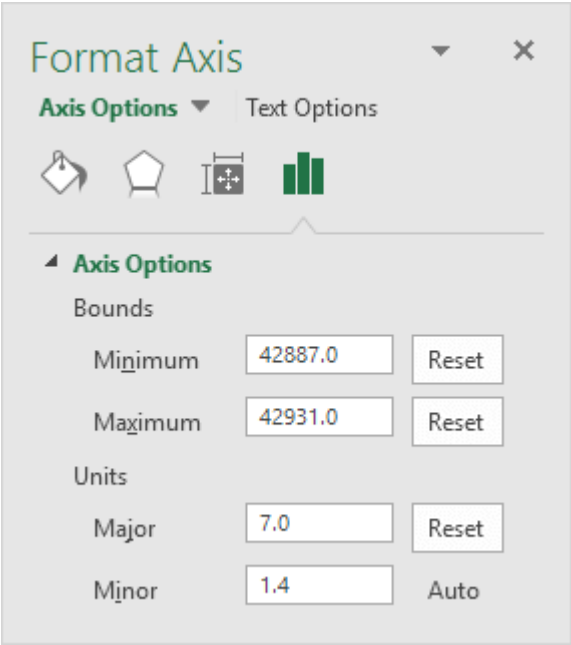
Result:



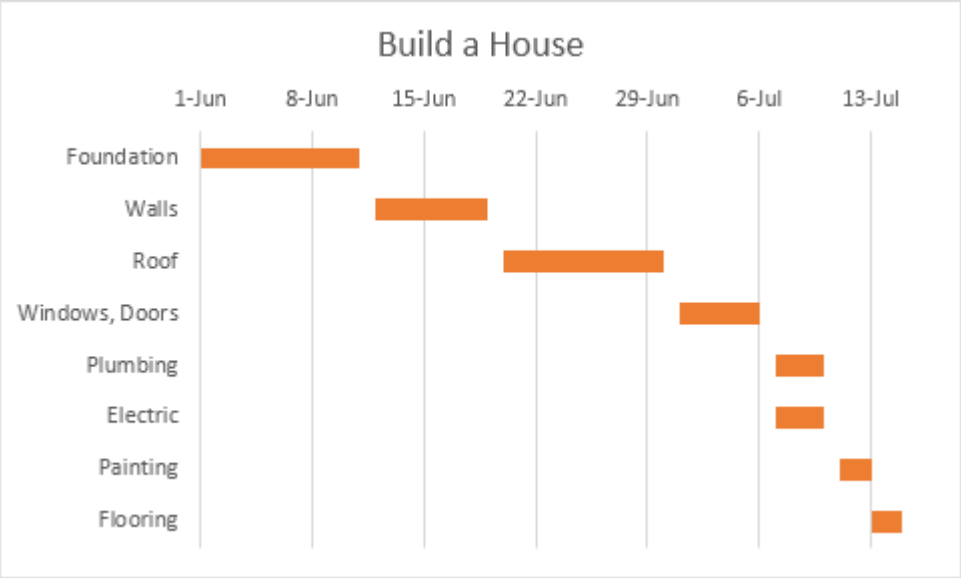
7. Right click the blue bars, click Format Data Series, Fill & Line icon, Fill, No fill.



8. Dates and times are stored as numbers in Excel and count the number of days since January 0, 1900. 1-jun-2017 (start) is the same as 42887. 15-jul-2017 (end) is the same as 42931. Right click the dates on the chart, click Format Axis and fix the minimum bound to 42887, maximum bound to 42931 and Major unit to 7.



Result: a Gantt chart in Excel.



Note that the plumbing and electrical work can be executed simultaneously.

16/17 Completed! Learn much more about charts >

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Table and Chart Combinations in Excel Power Pivot

Article Contributed By :

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Vote for difficulty

*** Solver: løser et lineært optimerings-problem

https://www.excel-easy.com/data-analysis/solver.html

Load the Solver Add-in | Formulate the Model | Trial and Error | Solve the Model

Excel includes a tool called solver that uses techniques from the operations research to find optimal solutions for all kind of decision problems.

I 2D giver betingelserne linjer, som sammen med akserne x=0, y=0 afgrænser området: løsningen findes på grænserne eller inde i området.

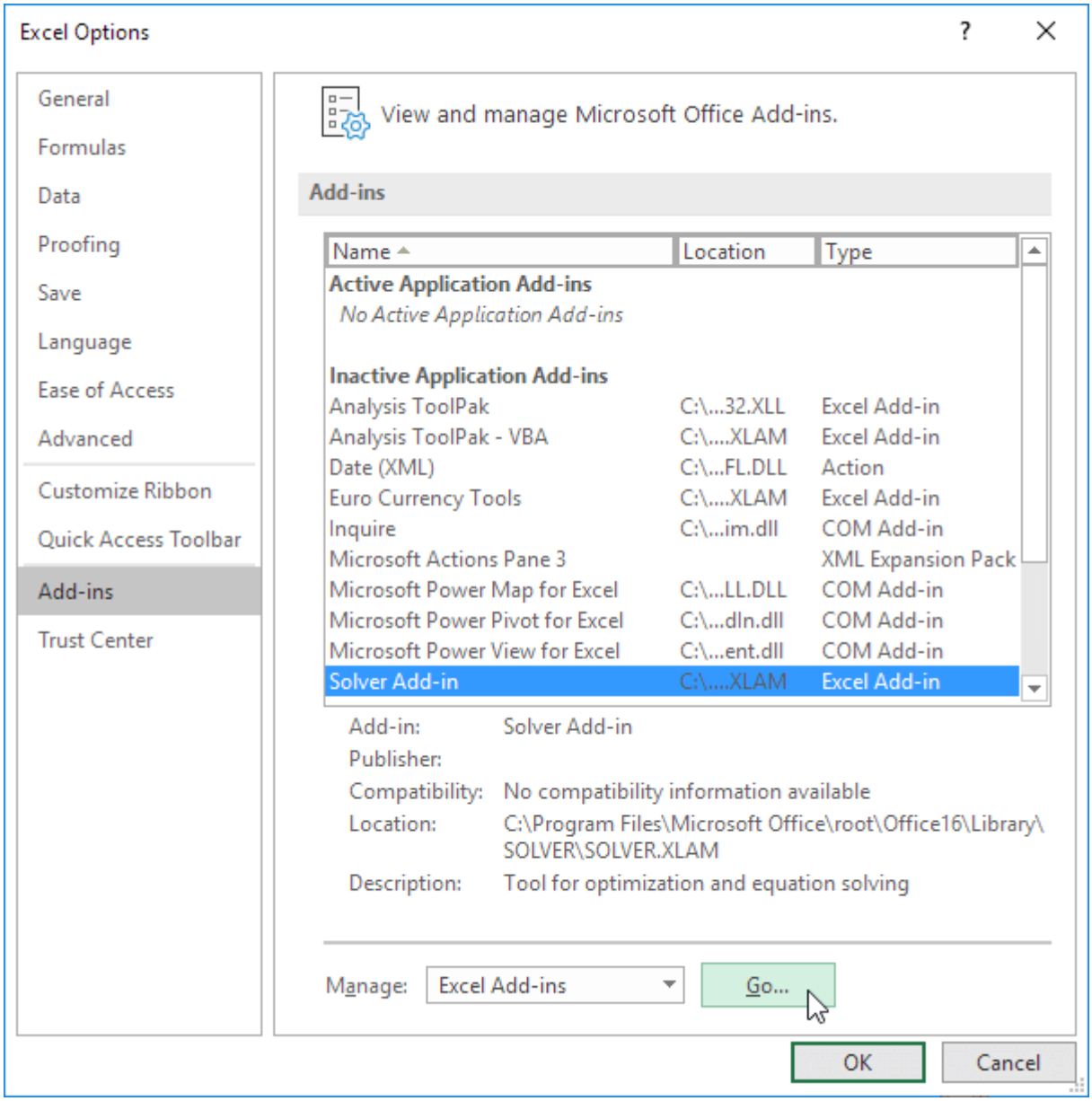
I nD giver betingelserne flader, som sammen med akse-planer x=0, y=0,.. afgrænser området: løsningen findes på grænserne eller inde i området.

Load the Solver Add-in

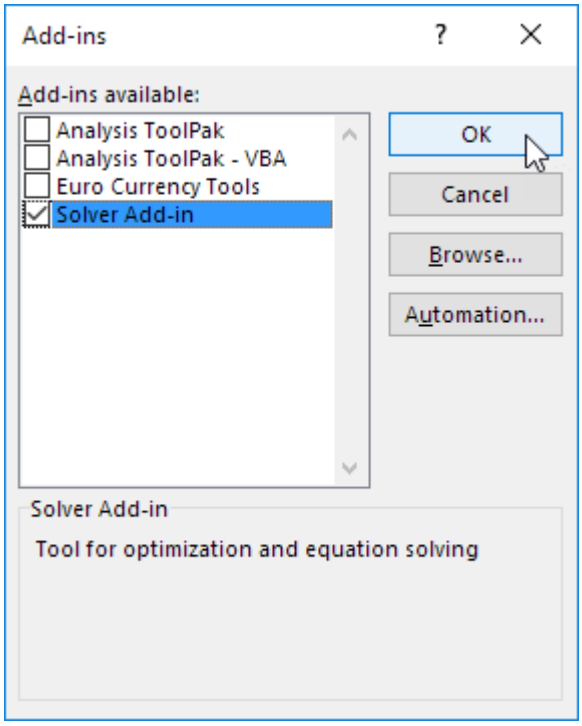
To load the solver add-in, execute the following steps.

1. On the File tab, click Options.

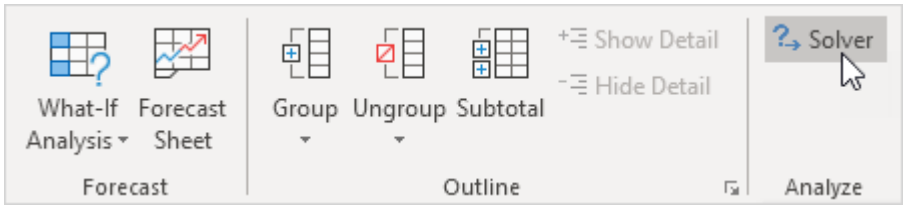
2. Under Add-ins, select Solver Add-in and click on the Go button.



3. Check Solver Add-in and click OK.



4. You can find the Solver on the Data tab, in the Analyze group.



Formulate the Model

The model we are going to solve looks as follows in Excel.

	A	B	C	D	E	F	G	H	I	J
1		Cycle Trader								
2										
3			Bicycles	Mopeds	Child Seats					
4		Unit Profit	100	300	50					
5							Resources		Resources	
6							Used		Available	
7		Capital	300	1200	120		0	≤	93000	
8		Storage	0.5	1	0.5		0	≤	101	
9										
10										
11			Bicycles	Mopeds	Child Seats				Total Profit	
12		Order Size	0	0	0				0	
13										

1. To formulate this linear programming model, answer the following three questions.

a. What are the decisions to be made? For this problem, we need Excel to find out how much to order of each product (bicycles, mopeds and child seats).

b. What are the constraints on these decisions? The constrains here are that the amount of capital and storage used by the products cannot exceed the limited amount of capital and storage (resources) available. For example, each bicycle uses 300 units of capital and 0.5 unit of storage.

c. What is the overall measure of performance for these decisions? The overall measure of performance is the total profit of the three products, so the objective is to maximize this quantity.

2. To make the model easier to understand,

create the following named ranges

Range Name	Cells
UnitProfit	C4:E4
OrderSize	C12:E12
ResourcesUsed	G7:G8
ResourcesAvailable	I7:I8
TotalProfit	I12

=ResourcesUsed viser hvilke celler der indgår

3. Insert the following three SUMPRODUCT functions.

E	F	G	H	I	J
Child Seats					
50					
		Resources Used		Resources Available	
120		=SUMPRODUCT(C7:E7,OrderSize)	≤	93000	
0.5		=SUMPRODUCT(C8:E8,OrderSize)	≤	101	
Child Seats				Total Profit	
0				=SUMPRODUCT(UnitProfit,OrderSize)	

Explanation: The amount of capital used equals the sumproduct of the range C7:E7 and OrderSize. The amount of storage used equals the sumproduct of the range C8:E8 and OrderSize. Total Profit equals the sumproduct of UnitProfit and OrderSize.

Trial and Error

With this formulation, it becomes easy to analyze any trial solution.

For example, if we order 20 bicycles, 40 mopeds and 100 child seats, the total amount of resources used does not exceed the amount of resources available. This solution has a total profit of 19000.

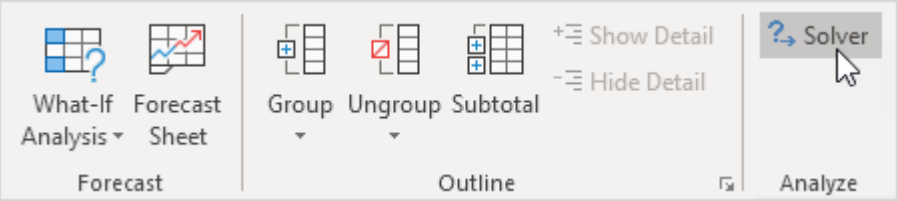
A	B	C	D	E	F	G	H	I	J
1	Cycle Trader								
2									
3		Bicycles	Mopeds	Child Seats					
4	Unit Profit	100	300	50					
5						Resources		Resources	
6						Used		Available	
7	Capital	300	1200	120		66000	≤	93000	
8	Storage	0.5	1	0.5		100	≤	101	
9									
10									
11		Bicycles	Mopeds	Child Seats				Total Profit	
12	Order Size	20	40	100				19000	
13									

It is not necessary to use trial and error. We shall describe next how the Excel Solver can be used to quickly find the optimal solution.

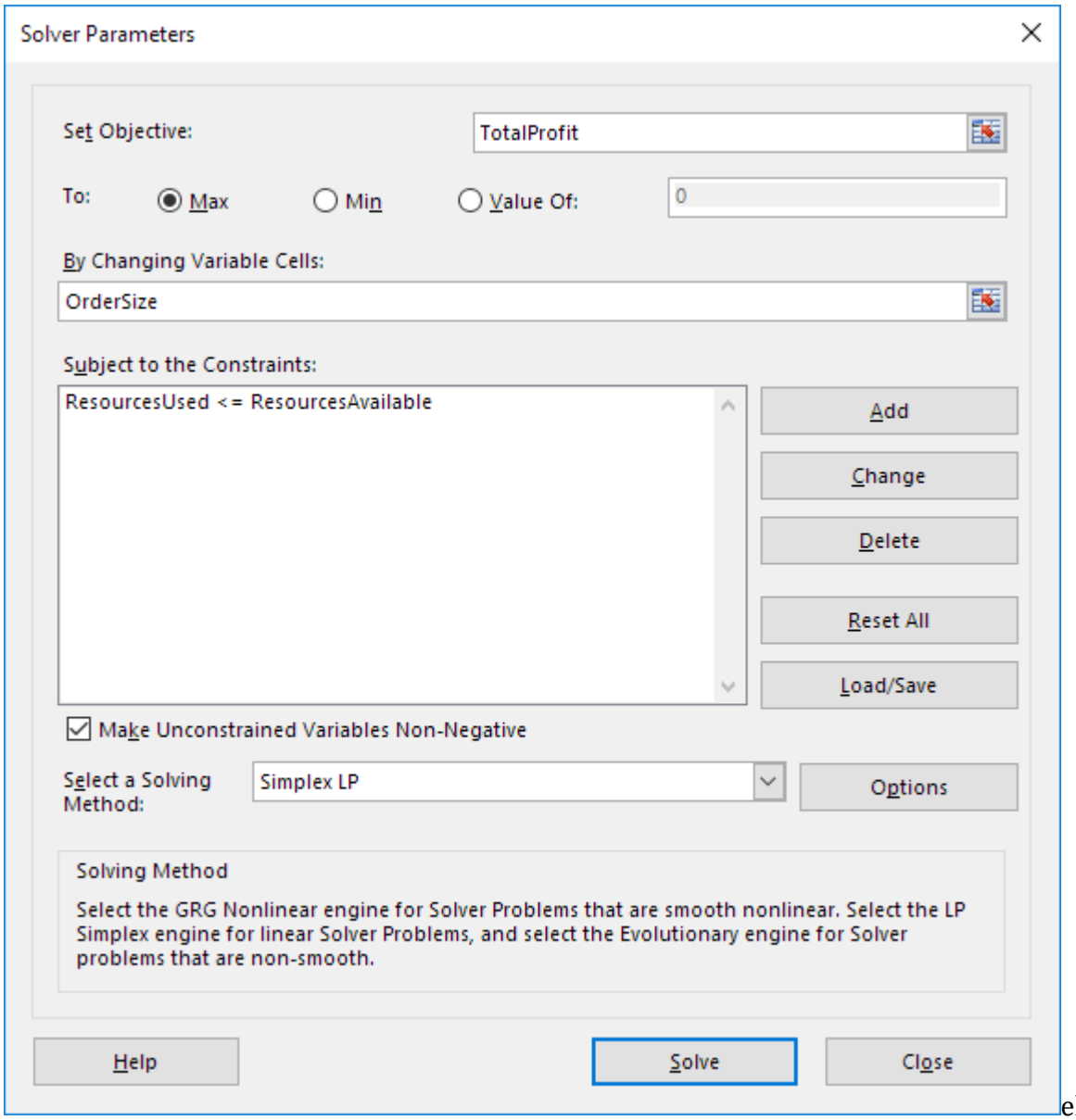
Solve the Model

To find the optimal solution, execute the following steps.

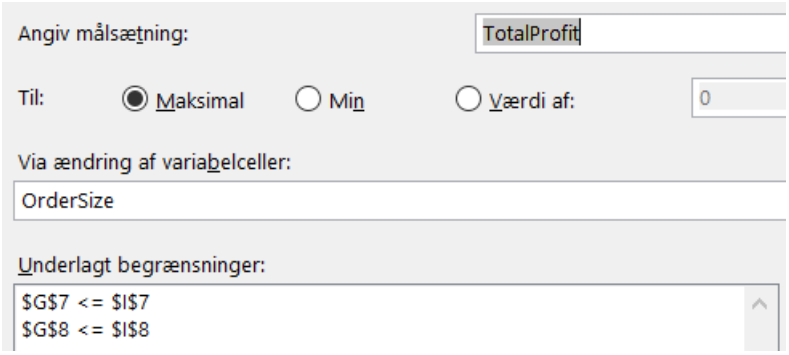
1. On the Data tab, in the Analyze group, click Solver.



Enter the solver parameters (read on). The result should be consistent with the picture below.



eller



You have the choice of typing the range names or clicking on the cells in the spreadsheet.

2. Enter TotalProfit for the Objective.

3. Click Max.

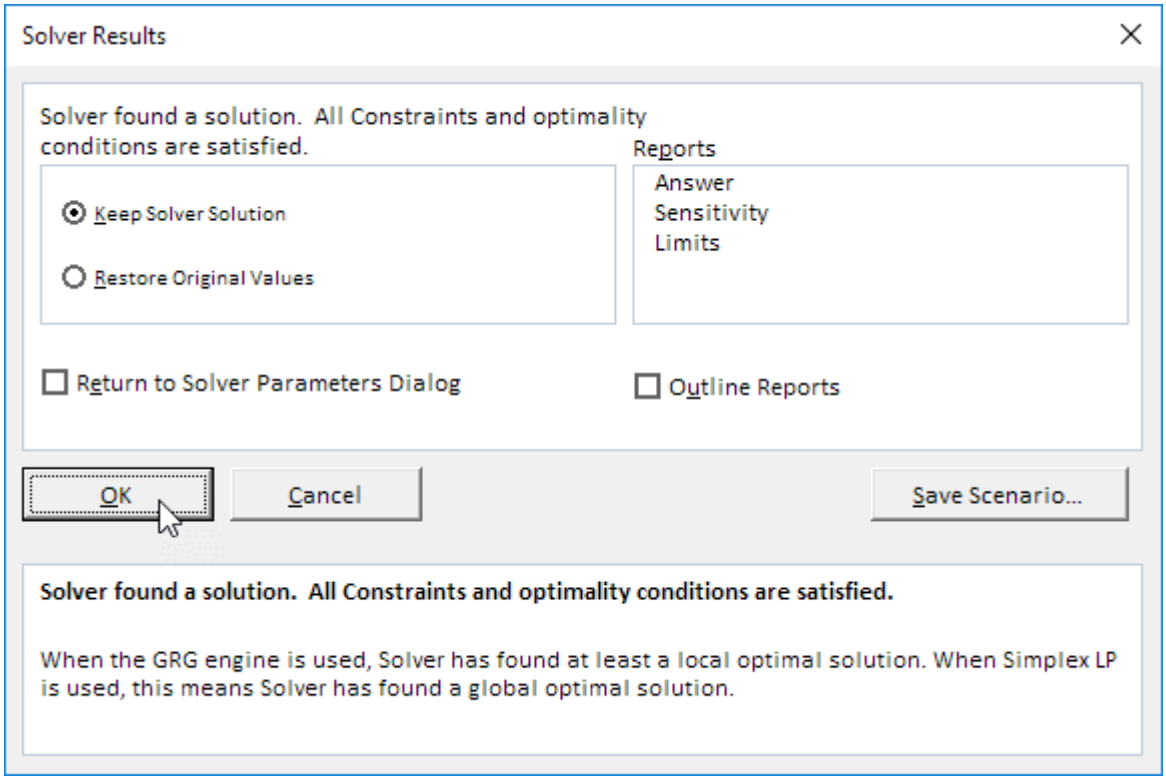
4. Enter OrderSize for the Changing Variable Cells.

5. Click Add to enter the following constraint.

6. Check 'Make Unconstrained Variables Non-Negative' and select 'Simplex LP'.

7. Finally, click Solve.

Result:



The optimal solution:

	A	B	C	D	E	F	G	H	I	J
1		Cycle Trader								
2										
3			Bicycles	Mopeds	Child Seats					
4		Unit Profit	100	300	50					
5							Resources		Resources	
6							Used		Available	
7		Capital	300	1200	120		93000	≤	93000	
8		Storage	0.5	1	0.5		101	≤	101	
9										
10										
11			Bicycles	Mopeds	Child Seats				Total Profit	
12		Order Size	94	54	0				25600	
13										

Conclusion: it is optimal to order 94 bicycles and 54 mopeds. This solution gives the maximum profit of 25600. This solution uses all the resources available. Try it yourself. Download the Excel file, enter the solver parameters (previous 7 steps) and find the optimal solution.

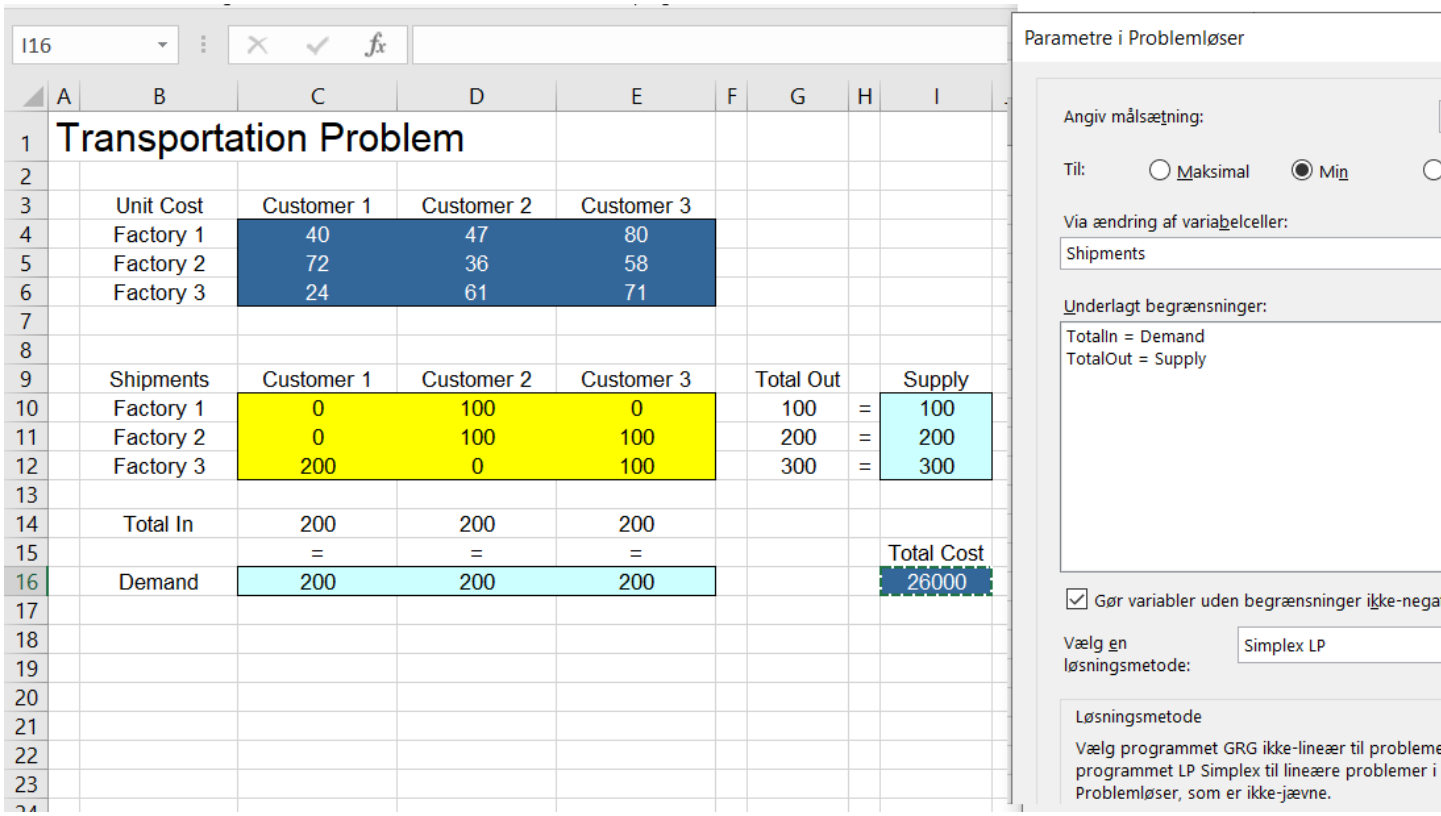
Enjoying this free website? Share Excel Easy on Facebook or let's continue learning!

Transportation Problem

Use the solver in Excel to find the number of units to ship from each factory to each customer that minimizes the total cost.

Formulate the Model

The model we are going to solve looks as follows in Excel. Filen: transportation-problem



	A	B	C	D	E	F	G	H	I
1		Transportation Problem							
2									
3		Unit Cost	Customer 1	Customer 2	Customer 3				
4		Factory 1	40	47	80				
5		Factory 2	72	36	58				
6		Factory 3	24	61	71				
7									
8									
9		Shipments	Customer 1	Customer 2	Customer 3		Total Out		Supply
10		Factory 1	0	100	0		100	=	100
11		Factory 2	0	100	100		200	=	200
12		Factory 3	200	0	100		300	=	300
13									
14		Total In	200	200	200				
15			=	=	=				Total Cost
16		Demand	200	200	200				26000

1. To formulate this transportation problem, answer the following three questions.

a. What are the decisions to be made? For this problem, we need Excel to find out how many units to ship from each factory to each customer.

b. What are the constraints on these decisions? Each factory has a fixed supply and each customer has a fixed demand.

c. What is the overall measure of performance for these decisions? The overall measure of performance is the total cost of the shipments, so the objective is to minimize this quantity.

2. To make the model easier to understand, create the following named ranges.

Range Name	Cells
UnitCost	C4:E6
Shipments	C10:E12

TotalIn må være totalinput til hver customer	C14:E14
Demand	C16:E16
TotalOut	G10:G12
Supply	I10:I12
TotalCost	I16

find the shortest path in a network

https://www.excel-easy.com/examples/shortest-path-problem.html

Use the solver in Excel to find the shortest path from node S to node T in an undirected network. Points in a network are called nodes (S, A, B, C, D, E and T). Lines in a network are called arcs (SA, SB, SC, AC, etc).

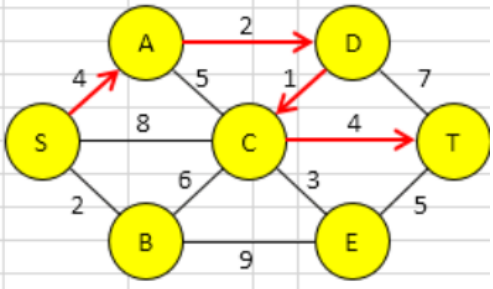
Formulate the Model

- The model we are going to solve looks as follows in Excel. Fil: shortest-path-problem.xlsx

Shortest Path Problem

From	To	Distance	Go
S	A	4	1
S	B	2	0
S	C	8	0
A	C	5	0
A	D	2	1
B	C	6	0
B	E	9	0
C	A	5	0
C	B	6	0
C	D	1	0
C	E	3	0
C	T	4	1
D	A	2	0
D	C	1	1
D	T	7	0
E	B	9	0
E	C	3	0
E	T	5	0
		Total Distance	11

Nodes	Net Flow		Supply/Demand
S	1	=	1
A	0	=	0
B	0	=	0
C	0	=	0
D	0	=	0
E	0	=	0
T	-1	=	-1



løsningen.

S->Goto A ..

maximum flow in a directed network

Use the solver in Excel to find the maximum flow from node S to node T in a directed network. Points in a network are called nodes (S, A, B, C, D, E and T). Lines in a network are called arcs (SA, SB, SC, AC, etc).

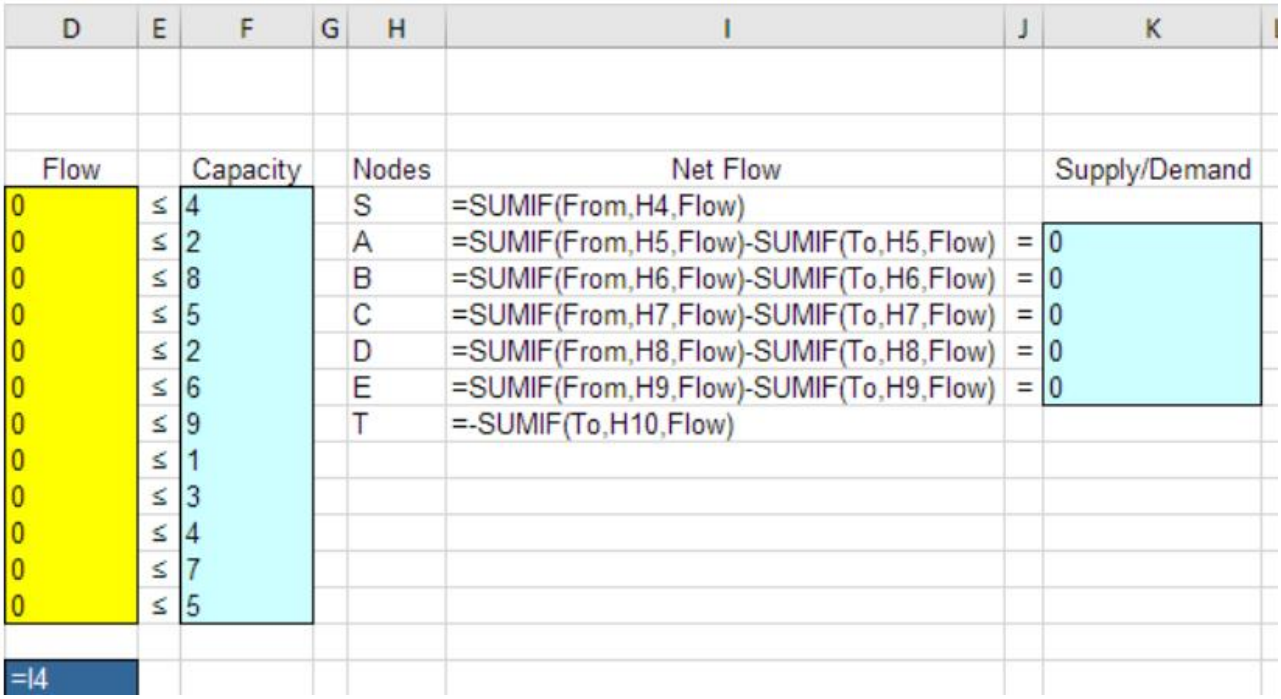
Formulate the Model

The model we are going to solve looks as follows in Excel.

=SUM.HVIS(From;H4;Flow) løber gennem From kolonnen, hvis der står H4=S i Ri, så tages værdien i Flow[Ri]

Sumif(From[],H4=S,Flow[]) løner gennem From[], 0,1 har S, sum{From[i]->Flow[i] }$_{\text{i med flow[i]=H4}}$

Explanation: The SUMIF functions calculate the Net Flow of each node. For node A, the first SUMIF function sums the values in the Flow column with an "A" in the From column (Flow Out). The second SUMIF function sums the values in the Flow column with an "A" in the To column (Flow In).



D	E	F	G	H	I	J	K
Flow		Capacity		Nodes	Net Flow		Supply/Demand
0	≤	4		S	=SUMIF(From,H4,Flow)		
0	≤	2		A	=SUMIF(From,H5,Flow)-SUMIF(To,H5,Flow)	=	0
0	≤	8		B	=SUMIF(From,H6,Flow)-SUMIF(To,H6,Flow)	=	0
0	≤	5		C	=SUMIF(From,H7,Flow)-SUMIF(To,H7,Flow)	=	0
0	≤	2		D	=SUMIF(From,H8,Flow)-SUMIF(To,H8,Flow)	=	0
0	≤	6		E	=SUMIF(From,H9,Flow)-SUMIF(To,H9,Flow)	=	0
0	≤	9		T	=-SUMIF(To,H10,Flow)		
0	≤	1					
0	≤	3					
0	≤	4					
0	≤	7					
0	≤	5					
=I4							

Trial and Error

With this formulation, it becomes easy to analyze any trial solution.

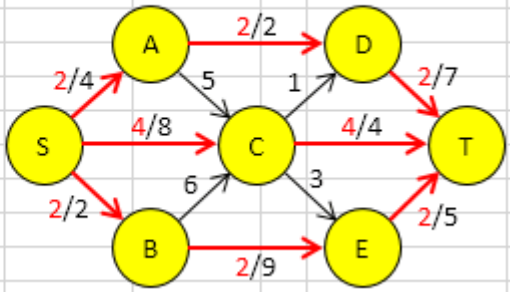
1. For example, the path SADT with a flow of 2. The path SCT with a flow of 4. The path SBET with a flow of 2. These paths give a total flow of 8.

Maximum Flow Problem

From	To	Flow		Capacity
S	A	2	≤	4
S	B	2	≤	2
S	C	4	≤	8
A	C	0	≤	5
A	D	2	≤	2
B	C	0	≤	6
B	E	2	≤	9
C	D	0	≤	1
C	E	0	≤	3
C	T	4	≤	4
D	T	2	≤	7
E	T	2	≤	5

Maximum Flow: 8

Nodes	Net Flow		Supply/Demand
S	8		
A	0	=	0
B	0	=	0
C	0	=	0
D	0	=	0
E	0	=	0
T	-8		



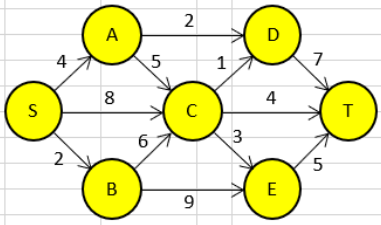
MaximumFlow er feltet D17, som igen er sat =I4

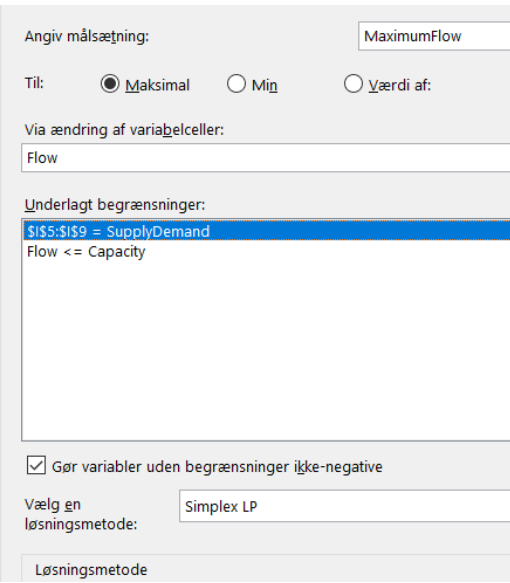
Maximum Flow Problem

From	To	Flow		Capacity
S	A	4	≤	4
S	B	2	≤	2
S	C	6	≤	8
A	C	2	≤	5
A	D	2	≤	2
B	C	0	≤	6
B	E	2	≤	9
C	D	1	≤	1
C	E	3	≤	3
C	T	4	≤	4
D	T	3	≤	7
E	T	5	≤	5

Maximum Flow: 12

Nodes	Net Flow		Supply/Demand
S	12		
A	0	=	0
B	0	=	0
C	0	=	0
D	0	=	0
E	0	=	0
T	-12		





Capital Investment

Use the solver in Excel to find the combination of capital investments that maximizes the total profit.

Formulate the Model

The model we are going to solve looks as follows in Excel.

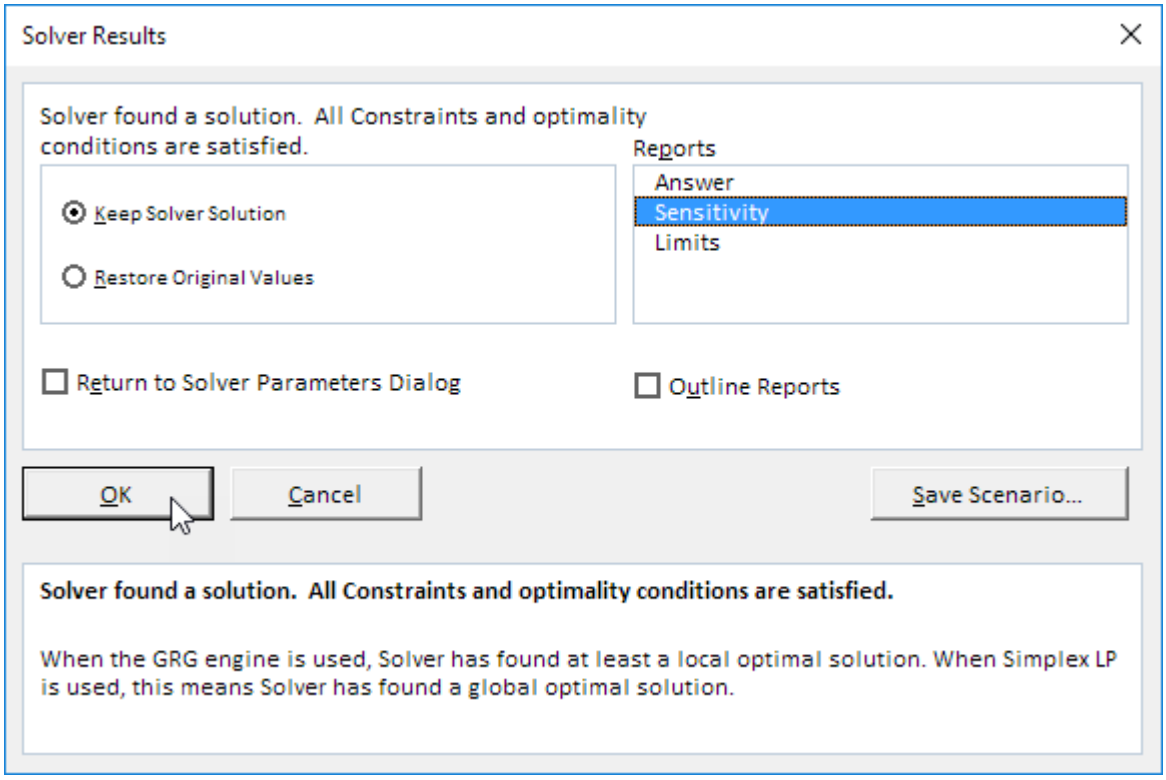
	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Capital Investment													
2														
3		Investment	One	Two	Three	Four	Five	Six	Seven					
4														
5		Profit	42	47	21	36	18	33	45					
6														
7		Capital	12	10	15	7	14	18	16		0	≤	50	
8		One or Two	1	1	0	0	0	0	0		0	≤	1	
9		Three or Four	0	0	1	1	0	0	0		0	≤	1	
10		Only Six, Seven, If Five	0	0	0	0	-2	1	1		0	≤	0	
11														
12													Total Profit	
13		Yes/No	0	0	0	0	0	0	0				0	
14														

Følsomhedsanalyse: hvad betyder ændring i unitprofiter og constraints for beregningen

Sensitivity Analysis

Sensitivity analysis gives you insight into how the optimal solution changes when you change the coefficients of the model. After the solver found a solution, you can create a sensitivity report.

1. Before you click OK, select Sensitivity from the Reports section.



Below you can find the optimal solution and the sensitivity report.

	A	B	C	D	E	F	G	H	I	J
1		Cycle Trader								
2										
3			Bicycles	Mopeds	Child Seats					
4		Unit Profit	100	300	50					
5							Resources		Resources	
6							Used		Available	
7		Capital	300	1200	120		93000	≤	93000	
8		Storage	0.5	1	0.5		101	≤	101	
9										
10										
11			Bicycles	Mopeds	Child Seats				Total Profit	
12		Order Size	94	54	0				25600	
13										

Microsoft Excel 16.0 Sensitivity Report
Worksheet: [sensitivity-analysis.xlsx]Sheet1
Report Created: 1/24/2020 10:34:47 AM

Variable Cells

Cell	Name	Final Value	Reduced Cost	Objective Coefficient	Allowable Increase	Allowable Decrease
C12	Order Size Bicycles	94	0	100	50	12.5
D12	Order Size Mopeds	54	0	300	66.66666667	100
E12	Order Size Child Seats	0	-20	50	20	1E+30

Constraints

Cell	Name	Final Value	Shadow Price	Constraint R.H. Side	Allowable Increase	Allowable Decrease
G7	Capital Used	93000	0.166666667	93000	28200	32400
G8	Storage Used	101	100	101	54	23.5

It is optimal to order 94 bicycles and 54 mopeds. This solution gives the maximum profit of 25600. This solution uses all the resources available (93000 units of capital and 101 units of storage). You can find these numbers in the Final Value column.

Reduced Cost: hvor meget skal unitProfit ændres for løsningen skifter

For childseat:)= -20(egentlig bør stå 20): reduceres cost med 20, øges unitProfit til 70, så skifter beregningen!

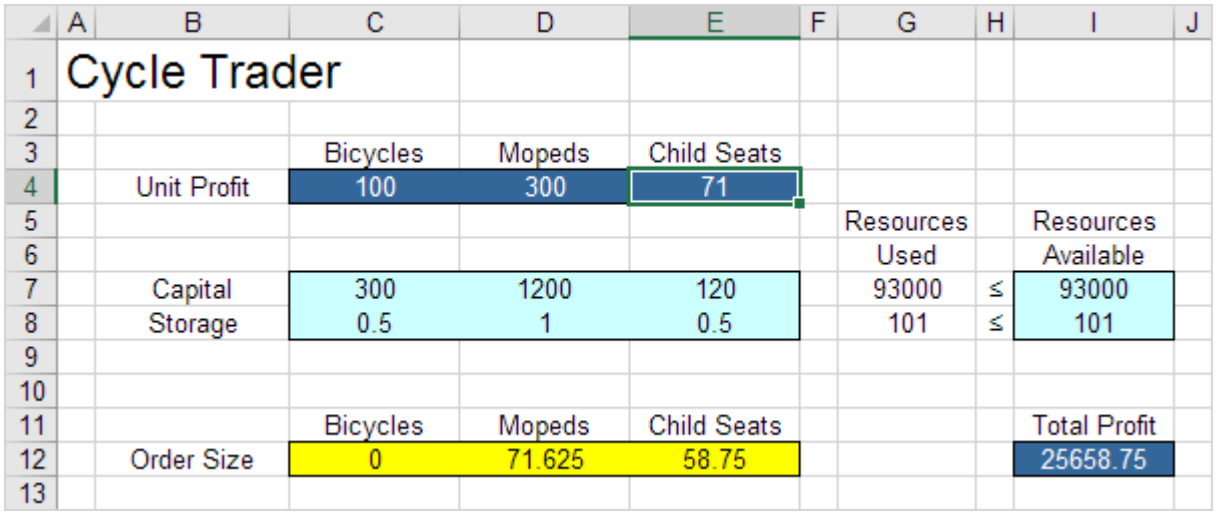
The reduced costs tell us how much the objective coefficients (unit profits) can be increased or decreased before the optimal solution changes. If we increase the unit profit of Child Seats by 20 or more units, the optimal solution changes.

1. At a unit profit of 69, it's still optimal to order 94 bicycles and 54 mopeds. Below you can find the optimal solution.

Cycle Trader

	Bicycles	Mopeds	Child Seats				
Unit Profit	100	300	69				
				Resources Used		Resources Available	
Capital	300	1200	120	93000	≤	93000	
Storage	0.5	1	0.5	101	≤	101	
	Bicycles	Mopeds	Child Seats			Total Profit	
Order Size	94	54	0			25600	

2. At a unit profit of 71, the optimal solution changes.



	A	B	C	D	E	F	G	H	I	J
1	Cycle Trader									
2										
3			Bicycles	Mopeds	Child Seats					
4		Unit Profit	100	300	71					
5							Resources		Resources	
6							Used		Available	
7		Capital	300	1200	120		93000	≤	93000	
8		Storage	0.5	1	0.5		101	≤	101	
9										
10										
11			Bicycles	Mopeds	Child Seats				Total Profit	
12		Order Size	0	71.625	58.75				25658.75	
13										

Conclusion: it is only profitable to order child seats if you can sell them for at least 70 units.

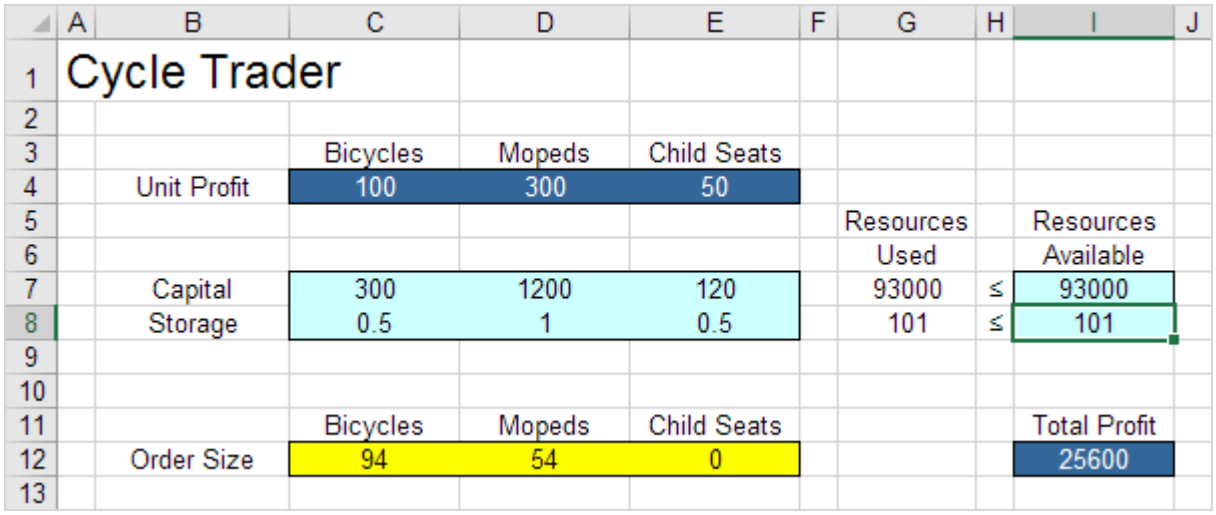
Shadow Price: ændres begrænsninger, så ændres profit med værdien

for storage=100: øges storage-constrain med 1, så øges profit med 100

for capital =0.1667: øges capital-avalable med 1, til 93000+1, så øges profit med 0.1667

The shadow prices tell us how much the optimal solution can be increased or decreased if we change the right hand side values (resources available) by one unit.

1. With 101 units of storage available, the total profit is 25600. Below you can find the optimal solution.



	A	B	C	D	E	F	G	H	I	J
1	Cycle Trader									
2										
3			Bicycles	Mopeds	Child Seats					
4		Unit Profit	100	300	50					
5							Resources		Resources	
6							Used		Available	
7		Capital	300	1200	120		93000	≤	93000	
8		Storage	0.5	1	0.5		101	≤	101	
9										
10										
11			Bicycles	Mopeds	Child Seats				Total Profit	
12		Order Size	94	54	0				25600	
13										

2. With 102 units of storage available, the total profit is 25700 (+100).

	A	B	C	D	E	F	G	H	I	J
1	Cycle Trader									
2										
3			Bicycles	Mopeds	Child Seats					
4		Unit Profit	100	300	50					
5							Resources		Resources	
6							Used		Available	
7		Capital	300	1200	120		93000	≤	93000	
8		Storage	0.5	1	0.5		102	≤	102	
9										
10										
11			Bicycles	Mopeds	Child Seats				Total Profit	
12		Order Size	98	53	0				25700	
13										

Note: with a shadow price of 100 for this resource, this is according to our expectations. This shadow price is only valid between 101 - 23.5 and 101 + 54 (see sensitivity report).

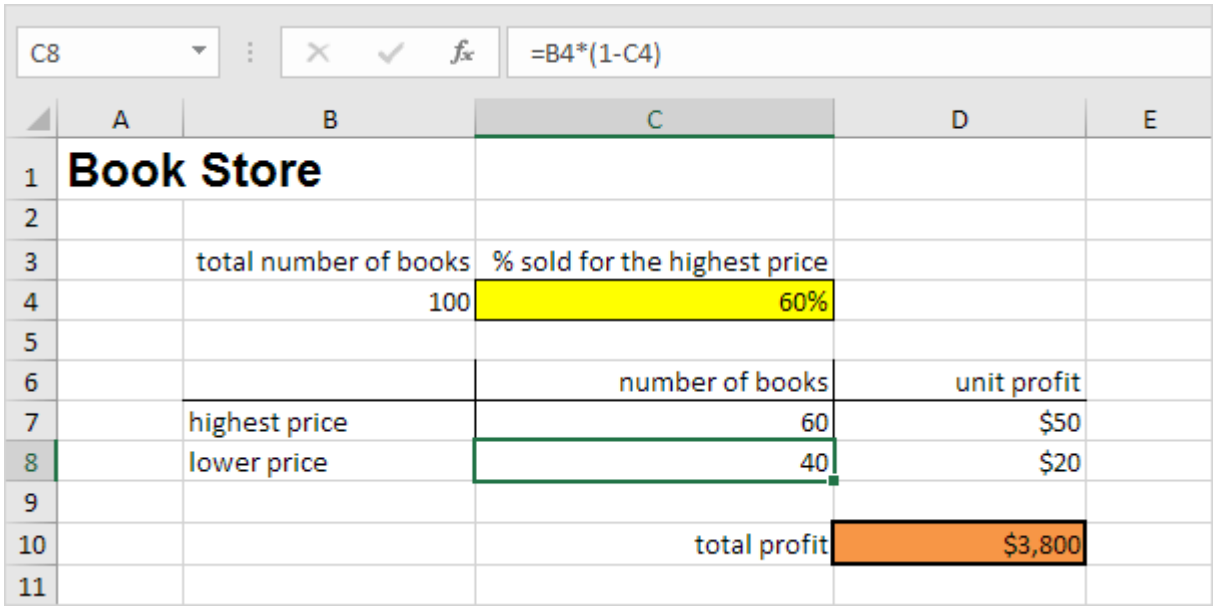
***What-If Analysis

https://www.excel-easy.com/data-analysis/what-if-analysis.html

datafile: what-if-analysis

What-If Analysis in Excel allows you to try out different values (scenarios) for formulas. The following example helps you master what-if analysis quickly and easily.

Assume you own a book store and have 100 books in storage. You sell a certain % for the highest price of $50 and a certain % for the lower price of $20.



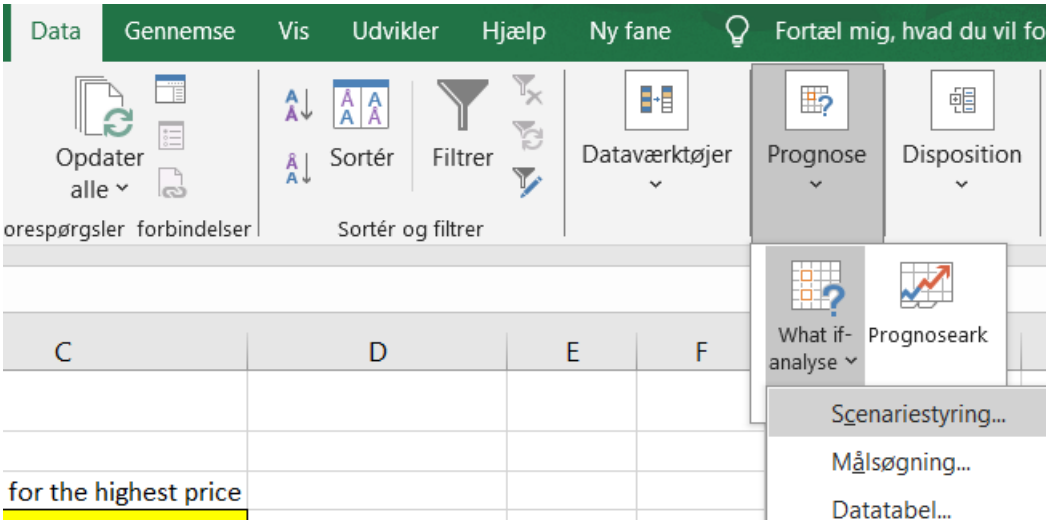
If you sell 60% for the highest price, cell D10 calculates a total profit of 60 * $50 + 40 * $20 = $3800.

Create Different Scenarios

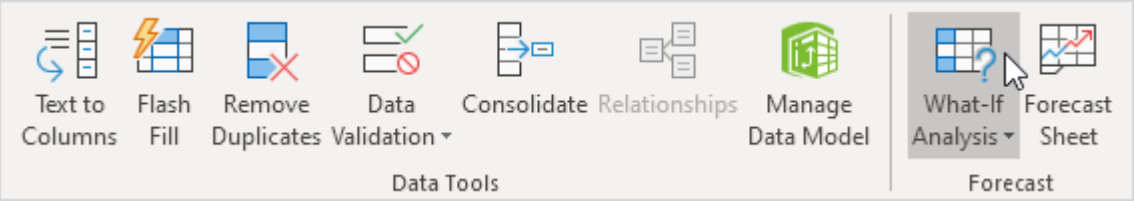
But what if you sell 70% for the highest price? And what if you sell 80% for the highest price? Or 90%, or even 100%? Each different percentage is a different scenario. You can use the Scenario Manager to create these scenarios.

Note: you can simply type in a different percentage into cell C4 to see the corresponding result of a scenario in cell D10. However, what-if analysis enables you to easily compare the results of different scenarios. Read on.

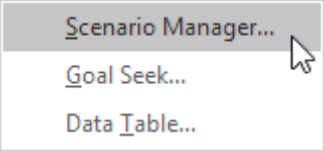
1. On the Data tab, in the Forecast group, click What-If Analysis.



2.

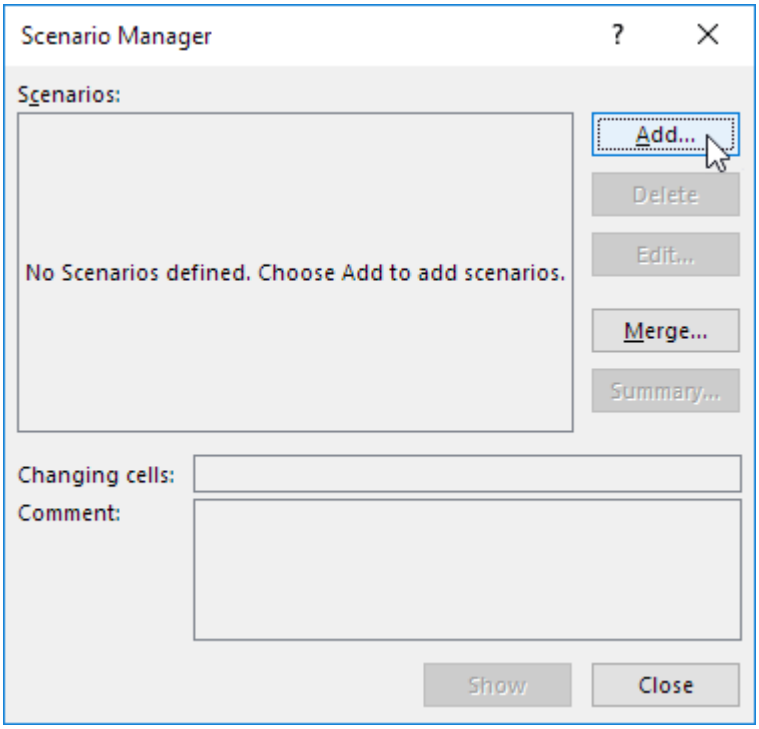


2. Click Scenario Manager.

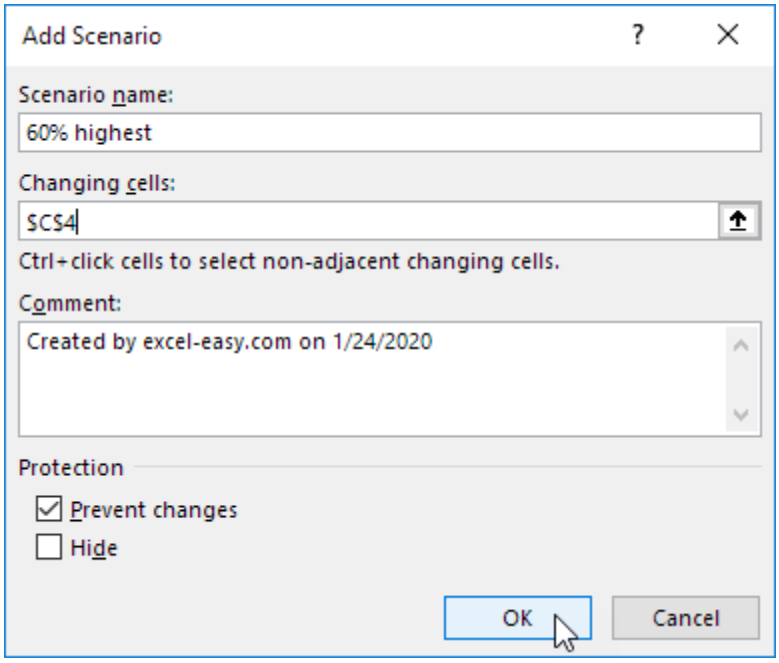


The Scenario Manager dialog box appears.

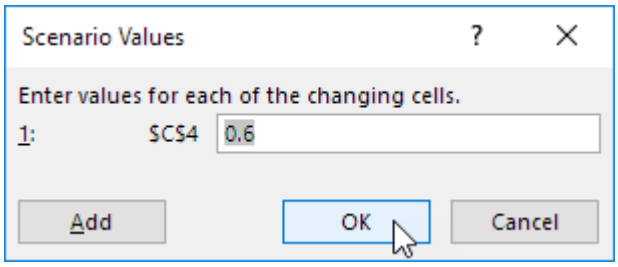
3. Add a scenario by clicking on Add.



4. Type a name (60% highest), select cell C4 (% sold for the highest price) for the Changing cells and click on OK.

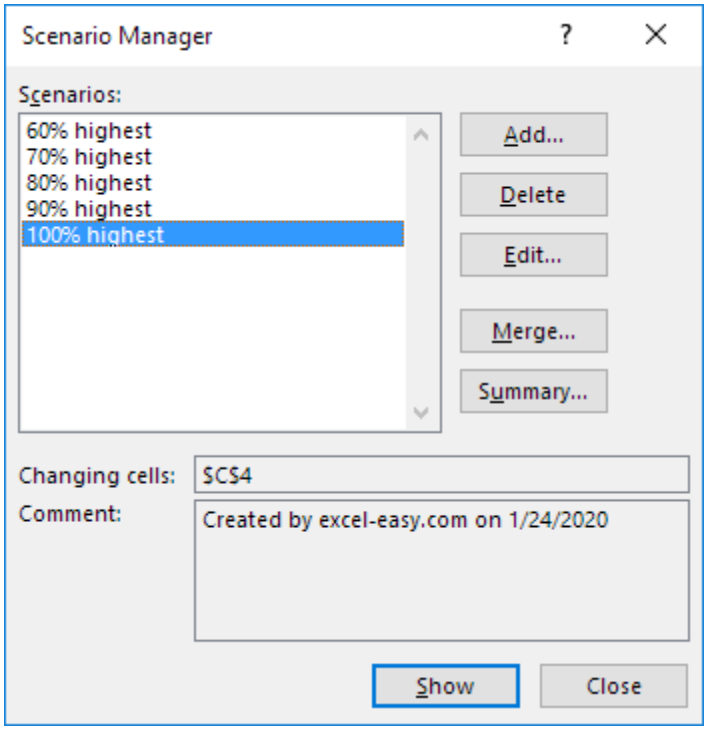


5. Enter the corresponding value 0.6 and click on OK again.



6. Next, add 4 other scenarios (70%, 80%, 90% and 100%).

Finally, your Scenario Manager should be consistent with the picture below:



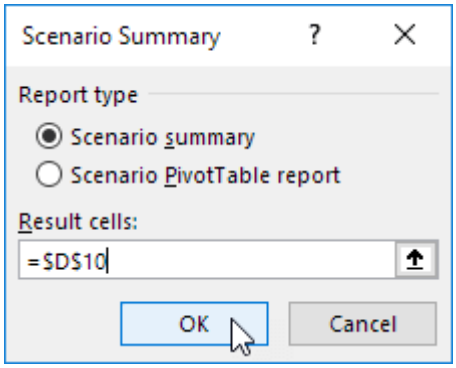
Note: to see the result of a scenario, select the scenario and click on the Show button. Excel will change the value of cell C4 accordingly for you to see the corresponding result on the sheet.

Scenario Summary

To easily compare the results of these scenarios, execute the following steps.

1. Click the Summary button in the Scenario Manager.

2. Next, select cell D10 (total profit) for the result cell and click on OK.



Tabel oprettes i nyt ark, kan dog kopieres og flyttes

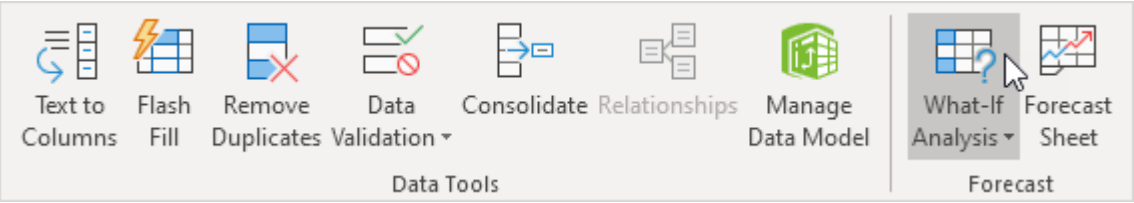
Scenario Summary						
	Current Values:	60% highest	70% highest	80% highest	90% highest	100% highest
Changing Cells:						
C4	60%	60%	70%	80%	90%	100%
Result Cells:						
D10	$3,800	$3,800	$4,100	$4,400	$4,700	$5,000
Notes: Current Values column represents values of changing cells at time Scenario Summary Report was created. Changing cells for each scenario are highlighted in gray.						

Conclusion: if you sell 70% for the highest price, you obtain a total profit of $4100, if you sell 80% for the highest price, you obtain a total profit of $4400, etc. That's how easy what-if analysis in Excel can be.

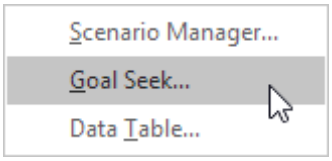
Goal Seek

What if you want to know how many books you need to sell for the highest price, to obtain a total profit of exactly $4700? You can use Excel's Goal Seek feature to find the answer.

1. On the Data tab, in the Forecast group, click What-If Analysis.



2. Click Goal Seek.



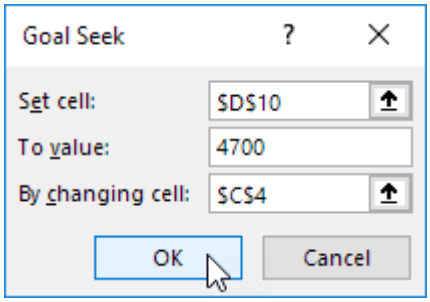
The Goal Seek dialog box appears.

3. Select cell D10.

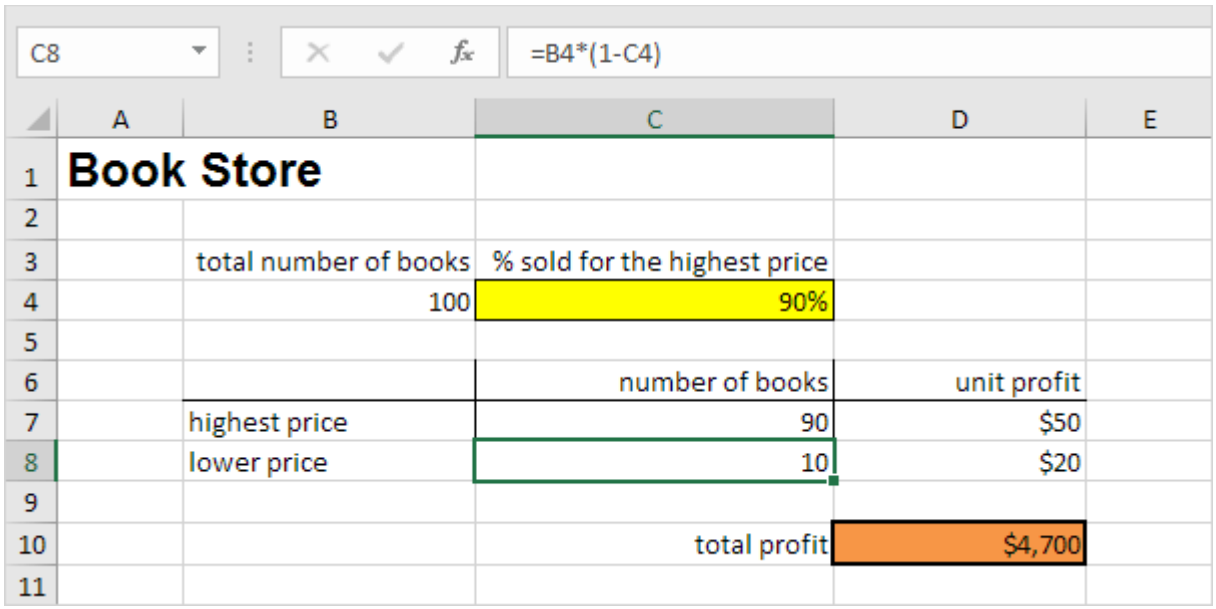
4. Click in the 'To value' box and type 4700.

5. Click in the 'By changing cell' box and select cell C4.

6. Click OK.



Result: you need to sell 90% of the books for the highest price to obtain a total profit of exactly $4700.



Note: visit our page about Goal Seek for more examples and tips.

1/4 Completed! Learn more about what-if analysis >
Go to Next Chapter: Solver

Data Tables : to quickly try out different values for formulas

Instead of creating different scenarios, you can create a data table to quickly try out different values for formulas. You can create a one variable data table or a two variable data table.

Assume you own a book store and have 100 books in storage. You sell a certain % for the highest price of $50 and a certain % for the lower price of $20. If you sell 60% for the highest price, cell D10 below calculates a total profit of 60 * $50 + 40 * $20 = $3800.

One Variable Data Table

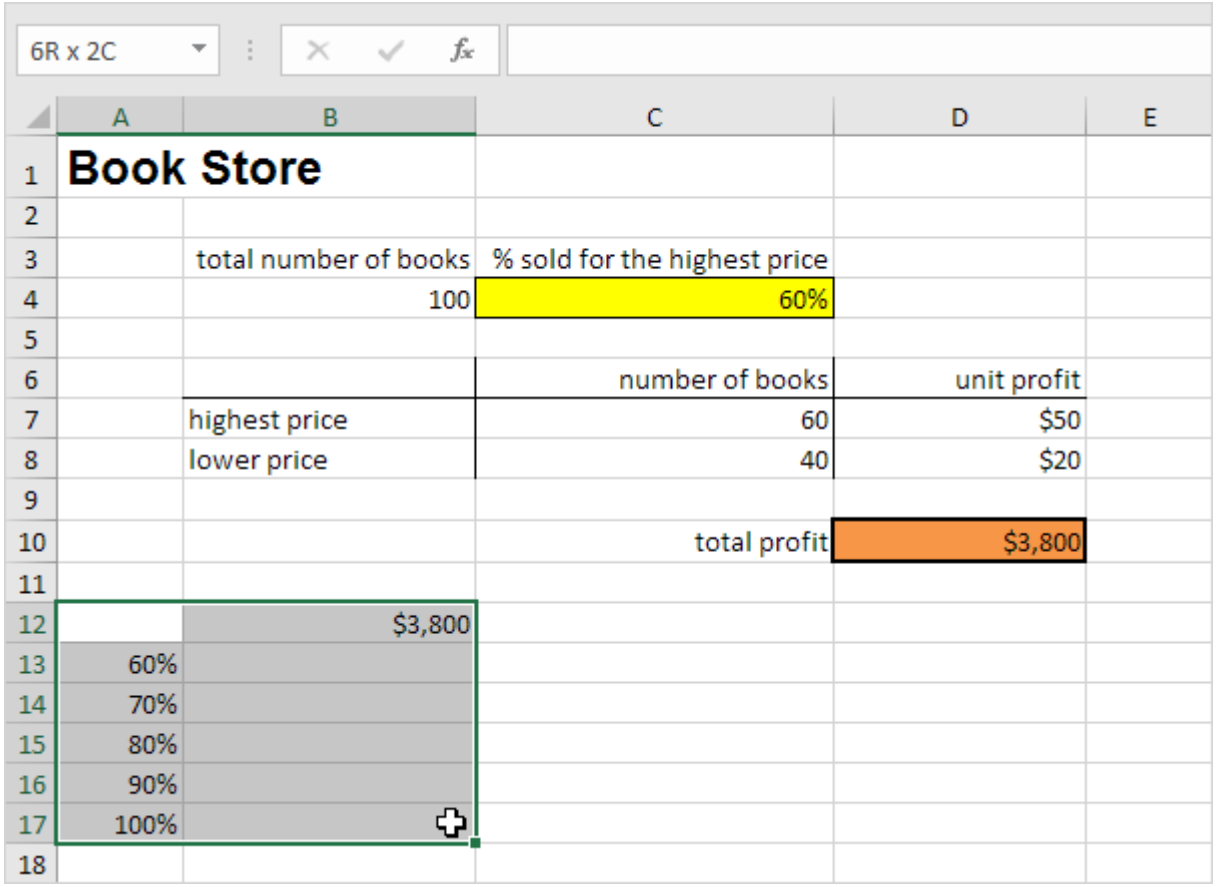
To create a one variable data table, execute the following steps.

1. Select cell B12 and type =D10 (refer to the total profit cell).

2. Type the different percentages in column A.

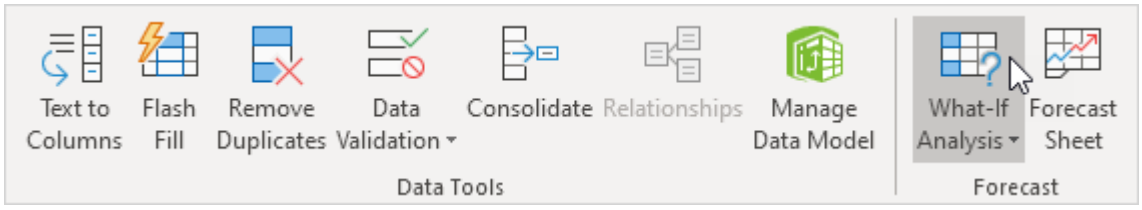
3. Select the range A12:B17.

We are going to calculate the total profit if you sell 60% for the highest price, 70% for the highest price, etc.

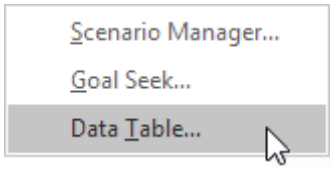


	A	B	C	D	E
1	**Book Store**				
2					
3		total number of books	% sold for the highest price		
4		100	60%		
5					
6			number of books	unit profit	
7		highest price	60	$50	
8		lower price	40	$20	
9					
10			total profit	$3,800	
11					
12		$3,800			
13	60%				
14	70%				
15	80%				
16	90%				
17	100%				
18					

4. On the Data tab, in the Forecast group, click What-If Analysis.

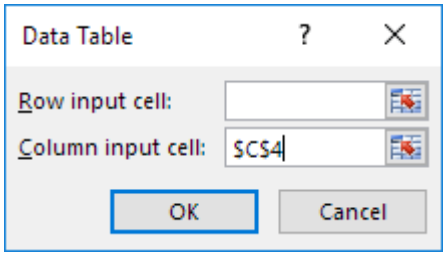


5. Click Data Table.



6. Click in the 'Column input cell' box (the percentages are in a column) and select cell C4.

We select cell C4 because the percentages refer to cell C4 (% sold for the highest price). Together with the formula in cell B12, Excel now knows that it should replace cell C4 with 60% to calculate the total profit, replace cell C4 with 70% to calculate the total profit, etc.



Note: this is a one variable data table so we leave the Row input cell blank.

7. Click OK.

Result:

B13 {=TABLE(,C4)}

	A	B	C	D	E
1	**Book Store**				
2					
3		total number of books	% sold for the highest price		
4		100	60%		
5					
6			number of books	unit profit	
7		highest price	60	$50	
8		lower price	40	$20	
9					
10			total profit	$3,800	
11					
12		$3,800			
13	60%	$3,800			
14	70%	$4,100			
15	80%	$4,400			
16	90%	$4,700			
17	100%	$5,000			
18					

Conclusion: if you sell 60% for the highest price, you obtain a total profit of $3800, if you sell 70% for the highest price, you obtain a total profit of $4100, etc.

Note: the formula bar indicates that the cells contain an array formula. Therefore, you cannot delete a single result. To delete the results, select the range B13:B17 and press Delete.

Two Variable Data Table

To create a two variable data table, execute the following steps.

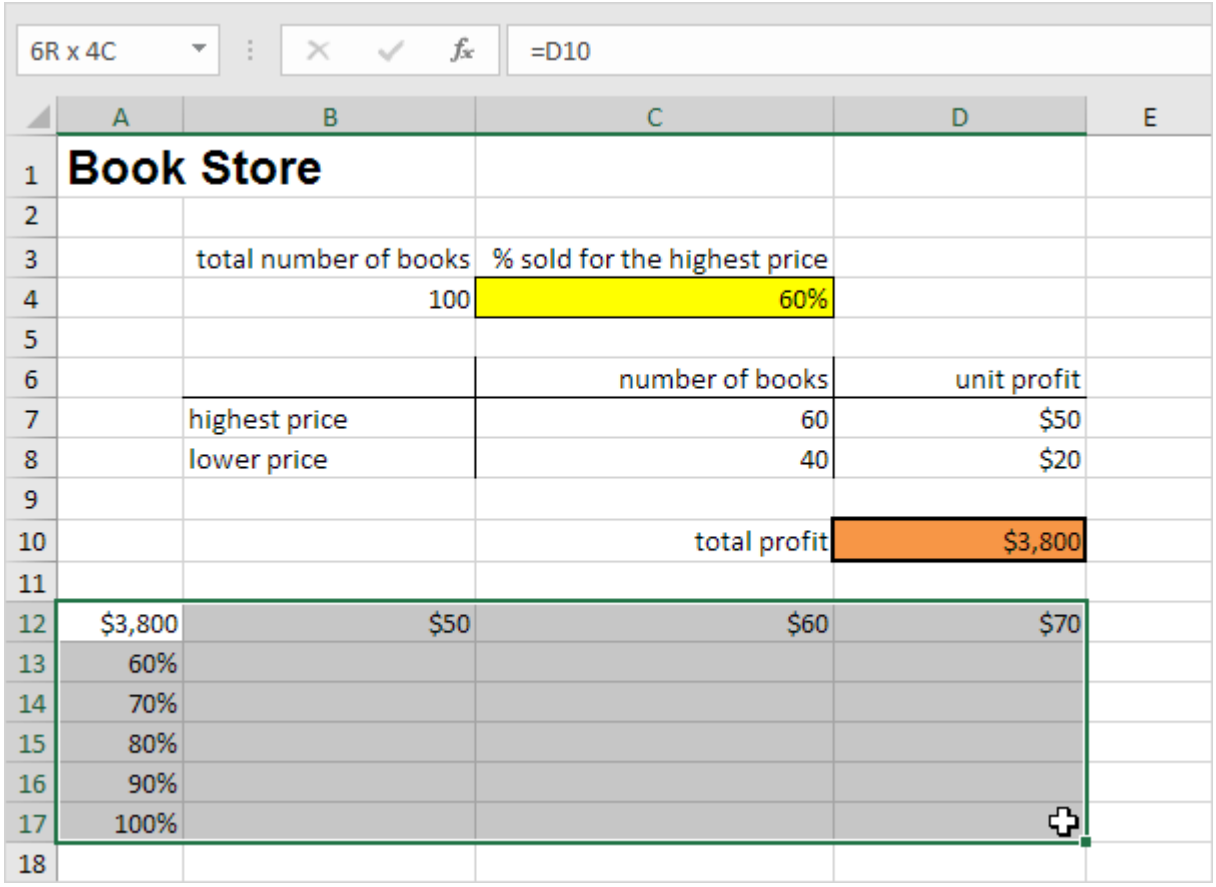
1. Select cell A12 and type =D10 (refer to the total profit cell).

2. Type the different unit profits (highest price) in row 12.

3. Type the different percentages in column A.

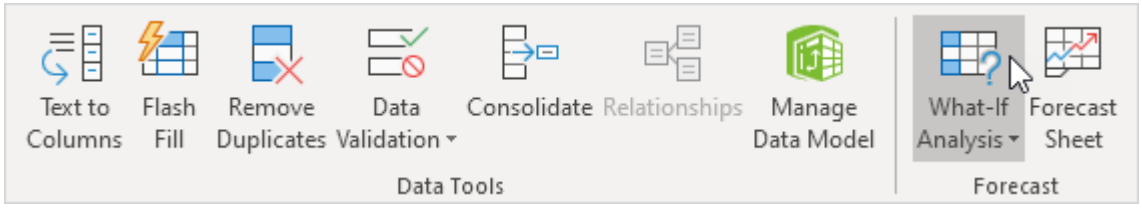
4. Select the range A12:D17.

We are going to calculate the total profit for the different combinations of 'unit profit (highest price)' and '% sold for the highest price'.

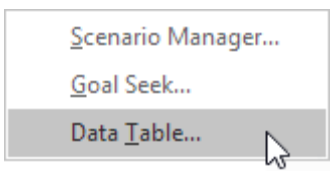


pgm ser at formlen i D10: kun D7 indgår i row-angivelsen, D8 bliver fastlåsttil 20

5. On the Data tab, in the Forecast group, click What-If Analysis.



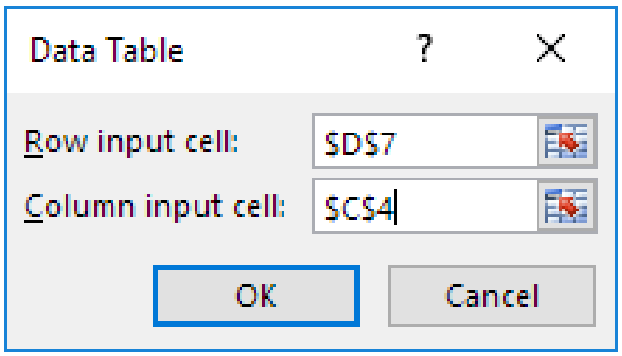
6. Click Data Table.



7. Click in the 'Row input cell' box (the unit profits are in a row) and select cell D7.

8. Click in the 'Column input cell' box (the percentages are in a column) and select cell C4.

We select cell D7 because the unit profits refer to cell D7. We select cell C4 because the percentages refer to cell C4. Together with the formula in cell A12, Excel now knows that it should replace cell D7 with $50 and cell C4 with 60% to calculate the total profit, replace cell D7 with $50 and cell C4 with 70% to calculate the total profit, etc.



9. Click OK.

Result:

B13 {=TABLE(D7,C4)}

	A	B	C	D	E
1	**Book Store**				
2					
3		total number of books	% sold for the highest price		
4		100	60%		
5					
6			number of books	unit profit	
7		highest price	60	$50	
8		lower price	40	$20	
9					
10			total profit	$3,800	
11					
12	$3,800	$50	$60	$70	
13	60%	$3,800	$4,400	$5,000	
14	70%	$4,100	$4,800	$5,500	
15	80%	$4,400	$5,200	$6,000	
16	90%	$4,700	$5,600	$6,500	
17	100%	$5,000	$6,000	$7,000	
18					

2DDataTable	pgm ser formlen i D10, kun D7 indgår, D8 bliver fastlåsttil 20			
D10=$4'700	50,00	60,00	70,00	80,00

	2000	2000	2000	2000
50%	3500	4000	4500	5000
60%	3800	4400	5000	5600
70%	4100	4800	5500	6200
80%	4400	5200	6000	6800
90%	4700	5600	6500	7400
100%	5000	6000	7000	8000

Conclusion: if you sell 60% for the highest price, at a unit profit of $50, you obtain a total profit of $3800, if you sell 80% for the highest price, at a unit profit of $60, you obtain a total profit of $5200, etc.

Note: the formula bar indicates that the cells contain an array formula. Therefore, you cannot delete a single result. To delete the results, select the range B13:D17 and press Delete.

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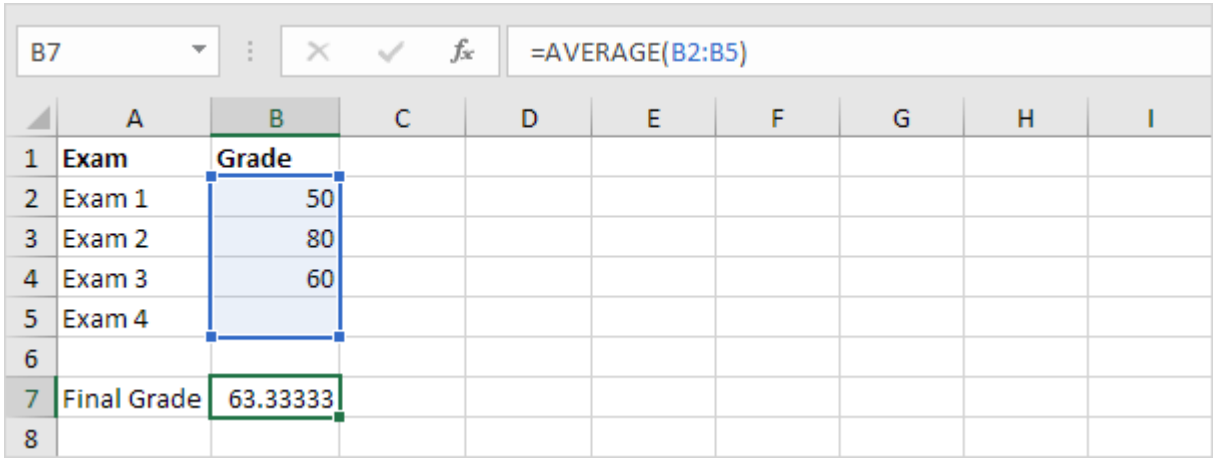
2/4 Completed! Learn more about what-if analysis >

If you know the result you want from a formula, use Goal Seek in Excel to find the input value that produces this formula result.

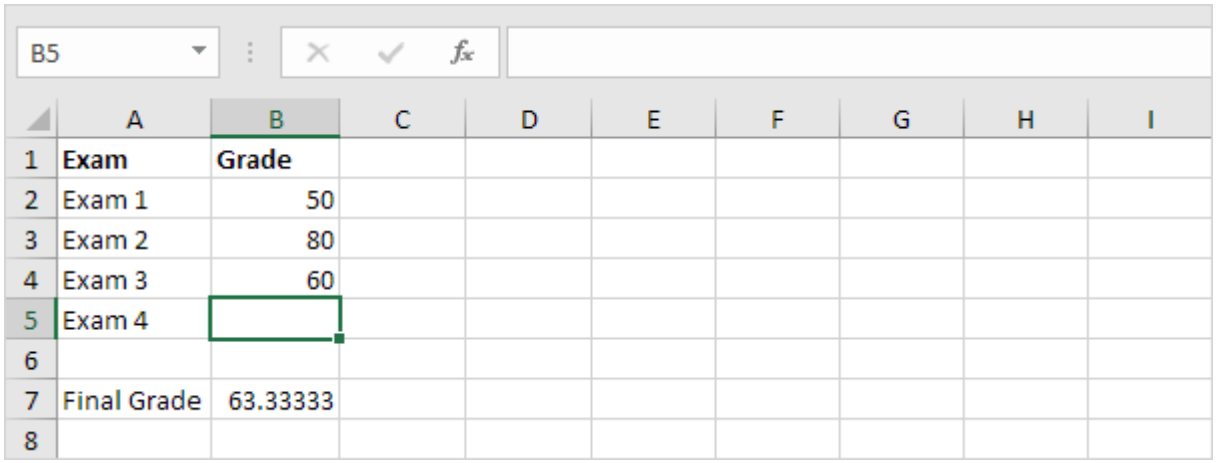
Goal Seek Example: ændre celleværdi for nå bestemt targetværdi

Use Goal Seek in Excel to find the grade on the fourth exam that produces a final grade of 70.

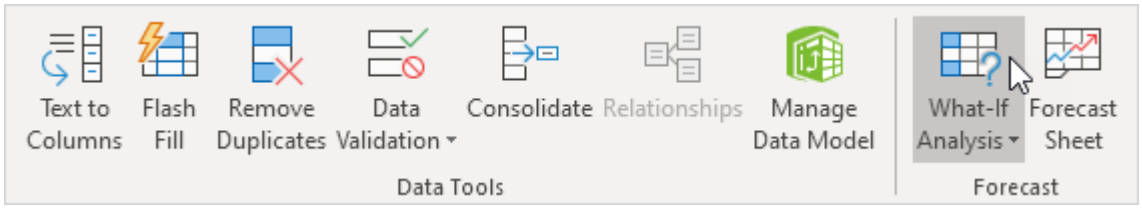
1. The formula in cell B7 calculates the final grade.



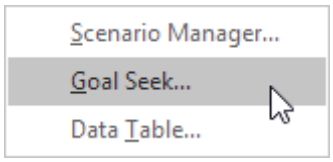
2. The grade on the fourth exam in cell B5 is the input cell.

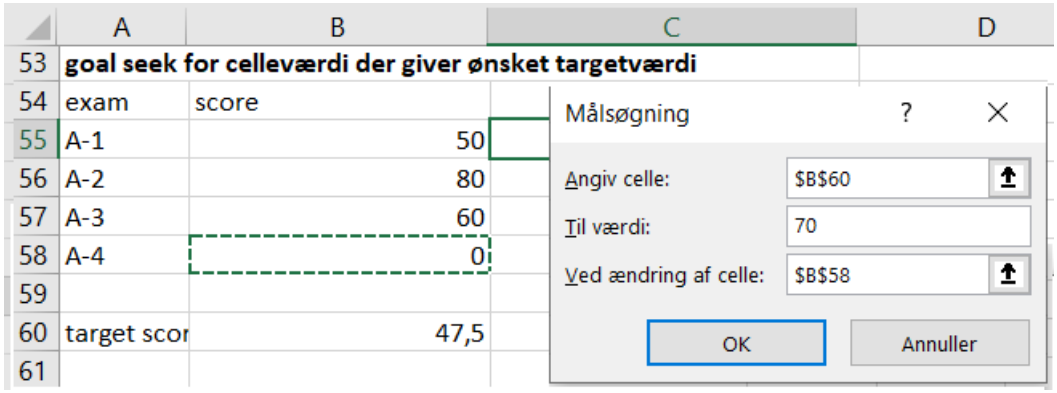


3. On the Data tab, in the Forecast group, click What-If Analysis.



4. Click Goal Seek.

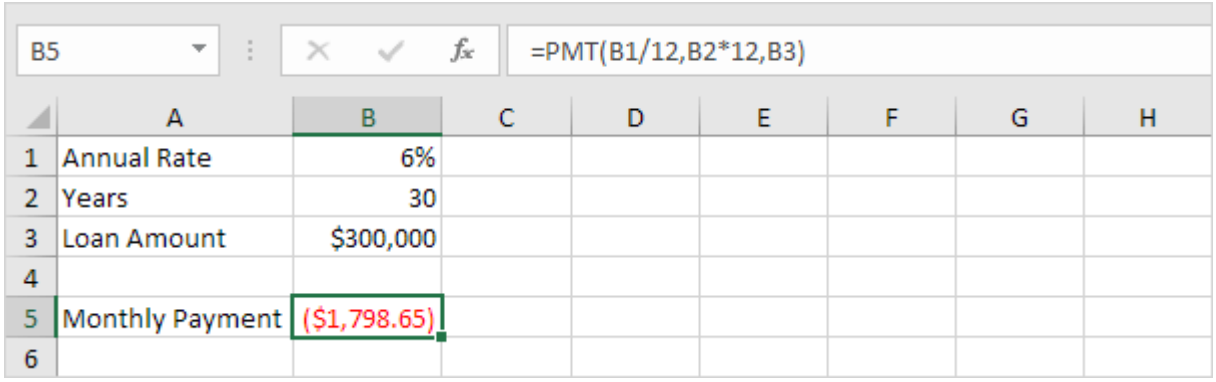




Goal Seek Example 2

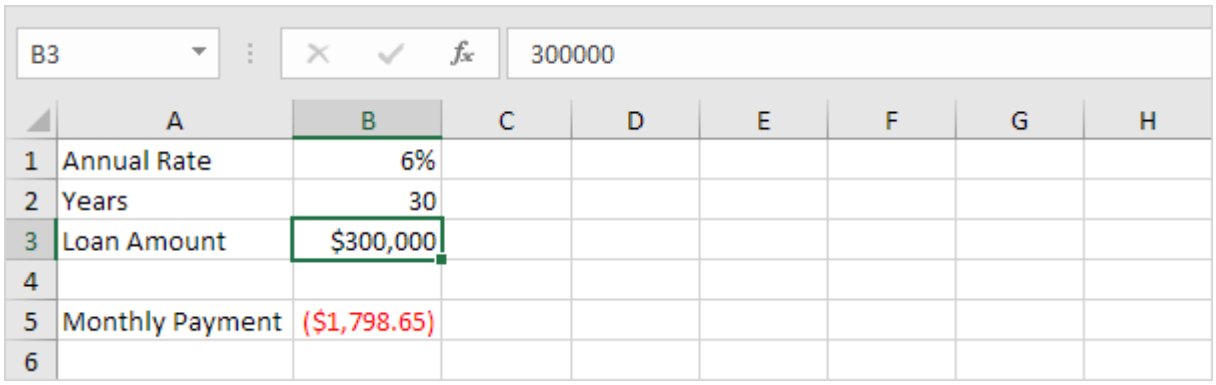
Use Goal Seek in Excel to find the loan amount that produces a monthly payment of $1500.

1. The formula in cell B5 calculates the monthly payment.

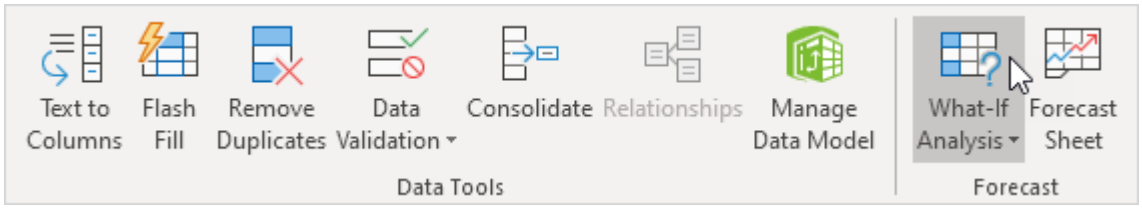


Explanation: the PMT function calculates the payment for a loan. If you've never heard of this function before, that's OK. The higher the loan amount, the higher the monthly payment. Assume, you can only afford $1500 a month. What is your maximum loan amount?

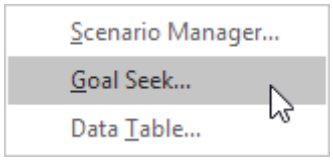
2. The loan amount in cell B3 is the input cell.



3. On the Data tab, in the Forecast group, click What-If Analysis.



4. Click Goal Seek.



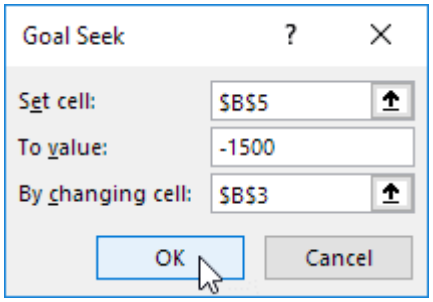
The Goal Seek dialog box appears.

5. Select cell B5.

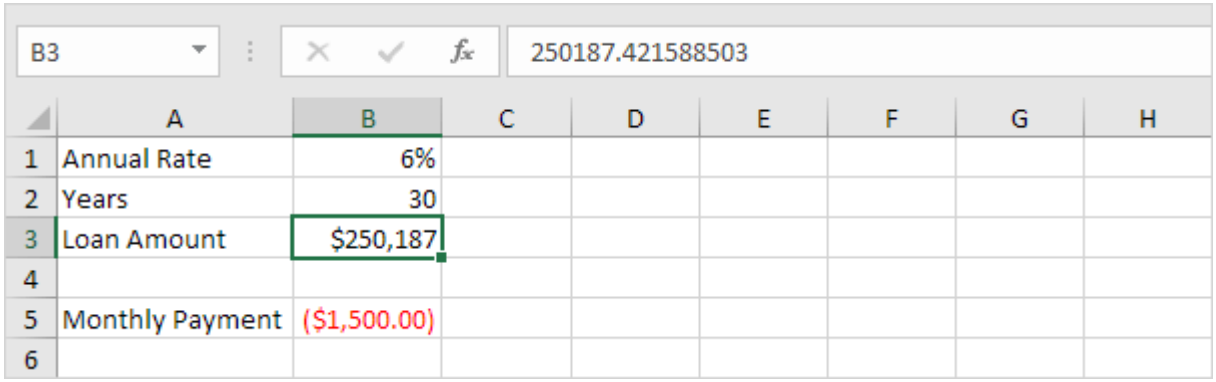
6. Click in the 'To value' box and type -1500 (negative, you are paying out money).

7. Click in the 'By changing cell' box and select cell B3.

8. Click OK.



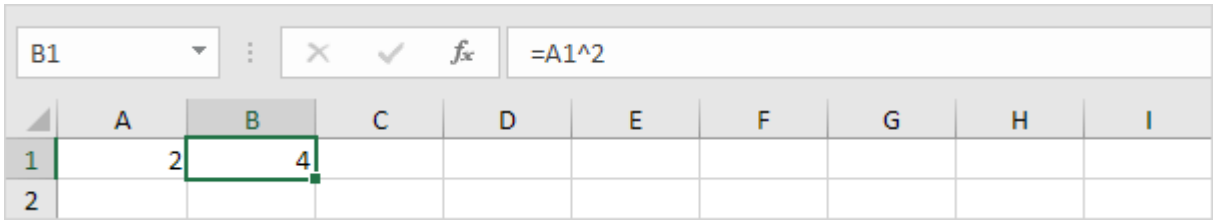
Result: a loan amount of $250,187 produces a monthly payment of $1500.



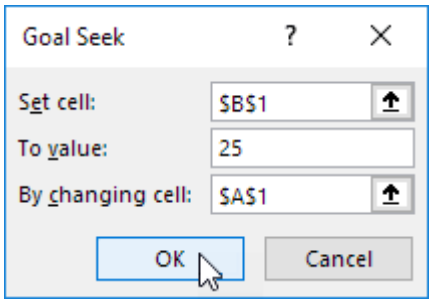
Goal Seek Precision

Goal Seek returns approximate solutions. You can change the iteration settings in Excel to find a more precise solution.

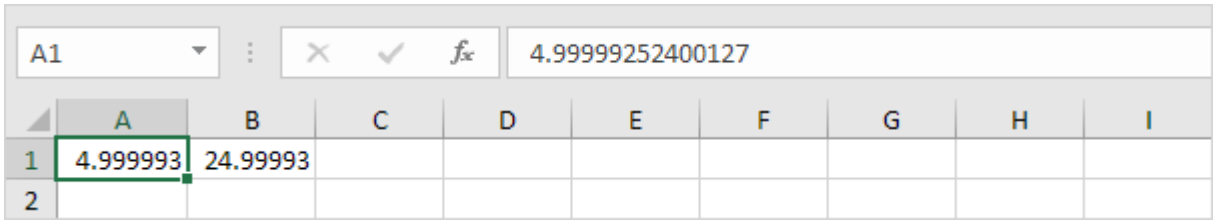
1. The formula in cell B1 calculates the square of the value in cell A1.



2. Use Goal Seek to find the input value that produces a formula result of 25.

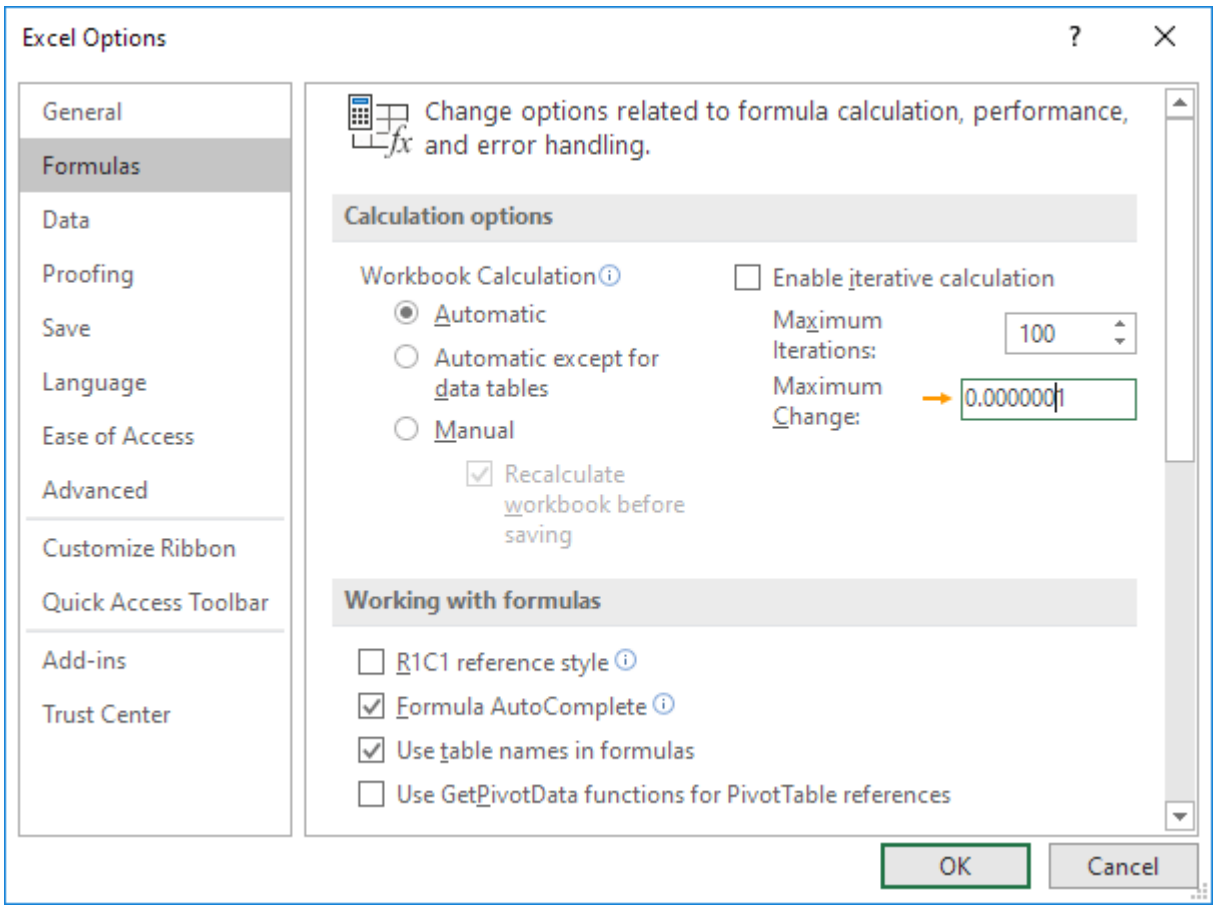


Result: Excel returns an approximate solution.



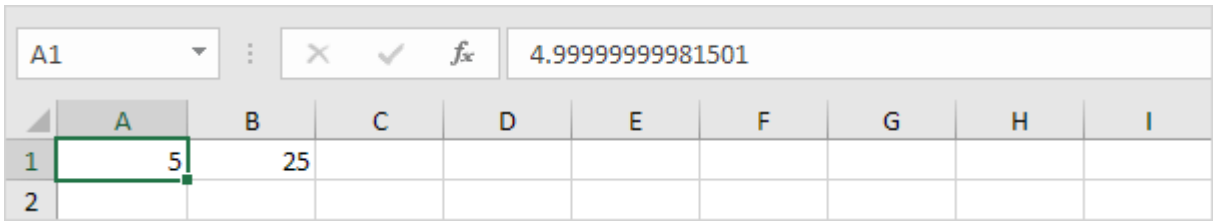
3. On the File tab, click Options, Formulas.

4. Under Calculation options, decrease the Maximum Change value by inserting some zeros. The default value is 0.001.



5. Click OK.

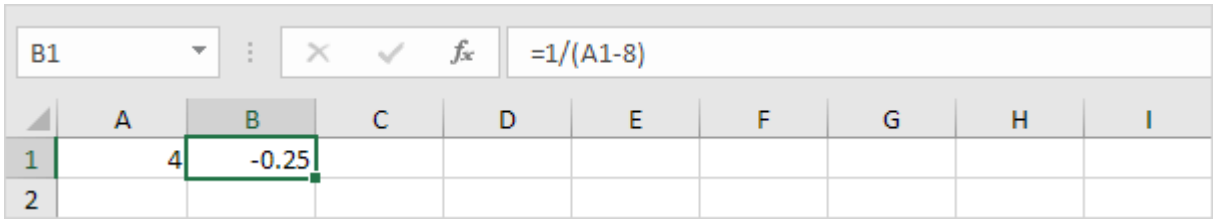
6. Use Goal Seek again. Excel returns a more precise solution.



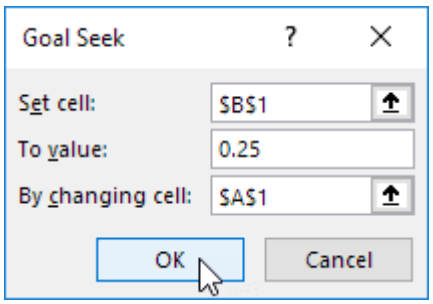
More about Goal Seek

There are many problems Goal Seek can't solve. Goal Seek requires a single input cell and a single output (formula) cell. Use the Solver in Excel to solve problems with multiple input cells. Sometimes you need to start with a different input value to find a solution.

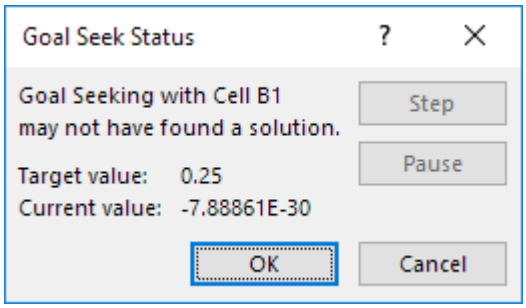
1. The formula in cell B1 below produces a result of -0.25.



2. Use Goal Seek to find the input value that produces a formula result of +0.25.

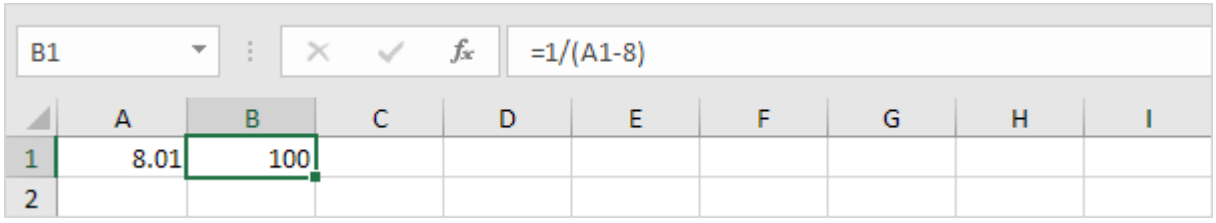


Result: Excel can't find a solution.

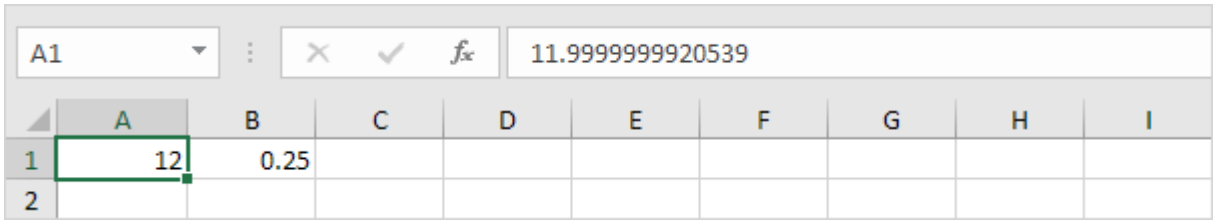


3. Click Cancel.

4. Start with an input value greater than 8.



5. Use Goal Seek again. Excel finds a solution.



Explanation: y = 1 / (x - 8) is discontinuous at x = 8 (dividing by 0 is not possible). In this example, Goal Seek cannot reach one side of the x-axis (x>8) if it starts on the other side of the x-axis (x<8) or vice versa.

*** ANOVA (analysis of variance) om datasæt har same middelværdi

https://www.excel-easy.com/examples/anova.html

This example teaches you how to perform a single factor ANOVA (analysis of variance) in Excel. A single factor or one-way ANOVA is used to test the null hypothesis that the means of several populations are all equal.

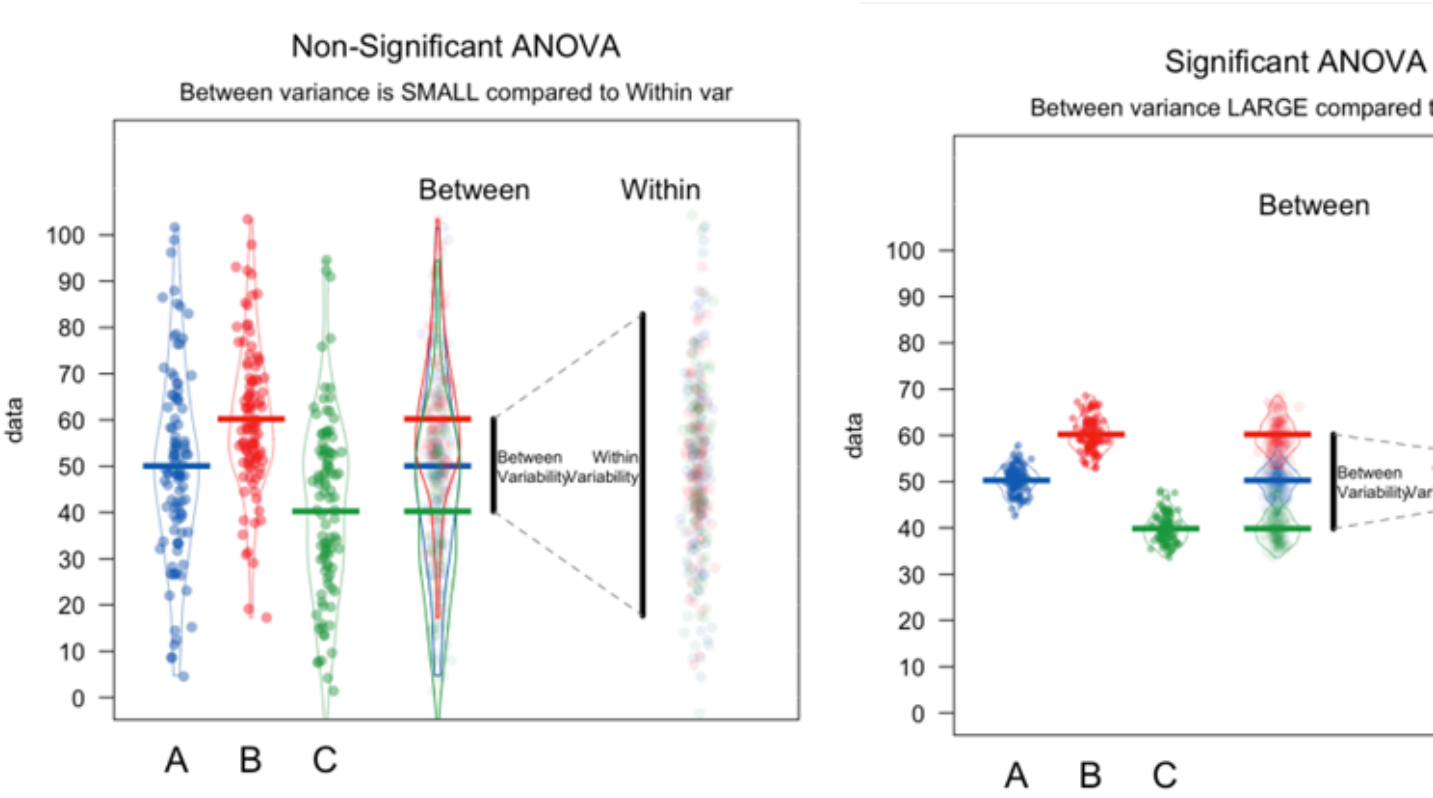
Below you can find the salaries of people who have a degree in economics, medicine or history.

H_0: $\mu_1 = \mu_2 = \mu_3$
H_1: at least one of the means is different.

	A	B	C	D
1	economics	medicine	history	
2	42	69	35	
3	53	54	40	
4	49	58	53	
5	53	64	42	
6	43	64	50	
7	44	55	39	
8	45	56	55	
9	52		39	
10	54		40	
11				

anov.xlsx

Grafisk forklaring til ANOVA:

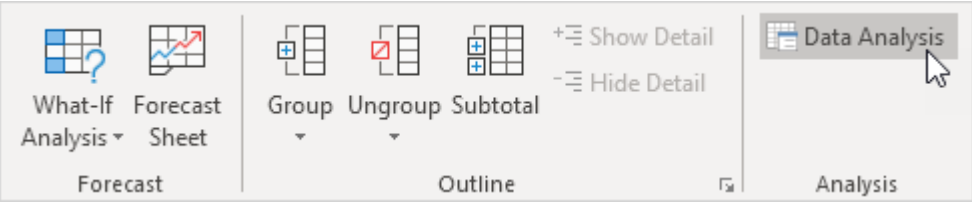


Her findes en factor med 3 værier

A nominal (factor) variable is one that contains a finite number of categories with no inherent order, her de tre grupper

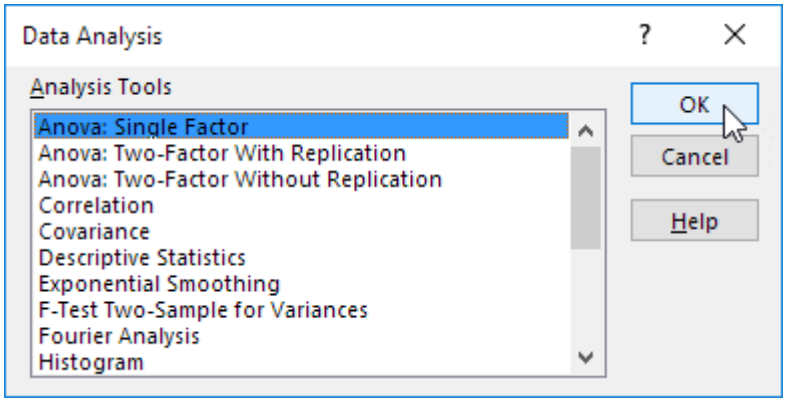
To perform a single factor ANOVA, execute the following steps.

1. On the Data tab, in the Analysis group, click Data Analysis.



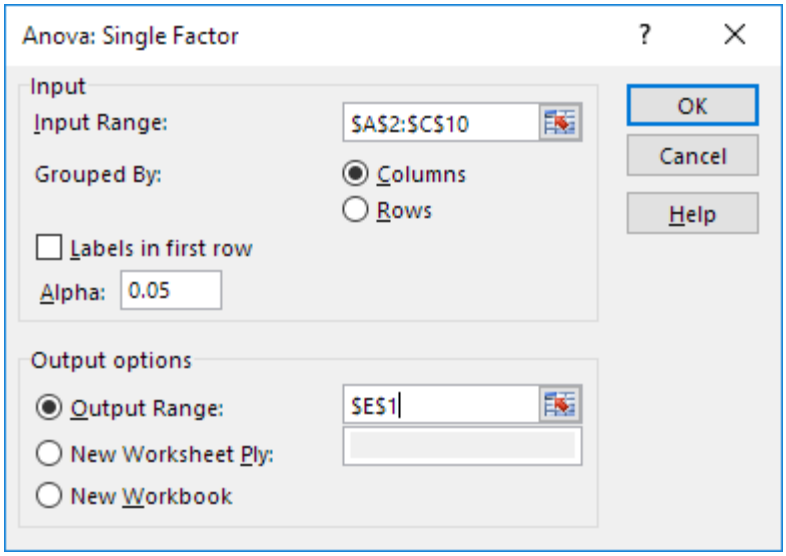
Note: can't find the Data Analysis button? Click here to load the Analysis ToolPak add-in.

2. Select Anova: Single Factor and click OK.



3. Click in the Input Range box and select the range A2:C10.

4. Click in the Output Range box and select cell E1.



5. Click OK.

Result:

E	F	G	H	I	J	K
Anova: Single Factor						
SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
Column 1	9	435	48.33333	23.5		
Column 2	7	420	60	32.33333		
Column 3	9	393	43.66667	50.5		
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1085.84	2	542.92	15.19623	7.16E-05	3.443357
Within Groups	786	22	35.72727			
Total	1871.84	24				

Conclusion: if F > F crit, we reject the null hypothesis. This is the case, 15.196 > 3.443, også P<<alfa . Therefore, we reject the null hypothesis:means er ens **The means of the three populations are not all equal**. At least one of the means is different. However, the ANOVA does not tell you where the difference lies.

You need a t-Test to test each pair of means.

F-Test: to test the null hypothesis that the variances of two populations are equal.

https://www.excel-easy.com/examples/f-test.html

This example teaches you how to perform an F-Test in Excel. The F-Test is used to test the null hypothesis that the variances of two populations are equal.

Below you can find the study hours of 6 female students and 5 male students.

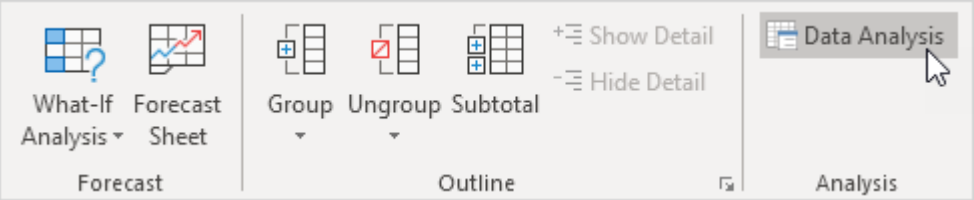
Dataark: F-test, T-test.xlsx

H_0: $\sigma_1^2 = \sigma_2^2$
H_1: $\sigma_1^2 \neq \sigma_2^2$

	A	B	C
1	Female	Male	
2	26	23	
3	25	30	
4	43	18	
5	34	25	
6	18	28	
7	52		
8			

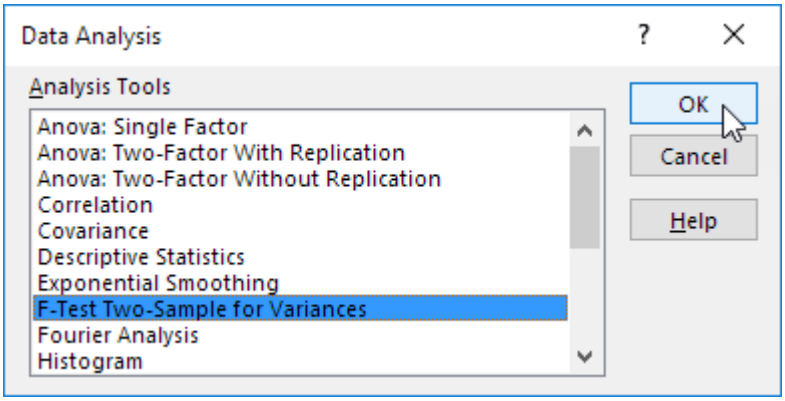
To perform an F-Test, execute the following steps.

1. On the Data tab, in the Analysis group, click Data Analysis.



Note: can't find the Data Analysis button? Click here to load the Analysis ToolPak add-in.

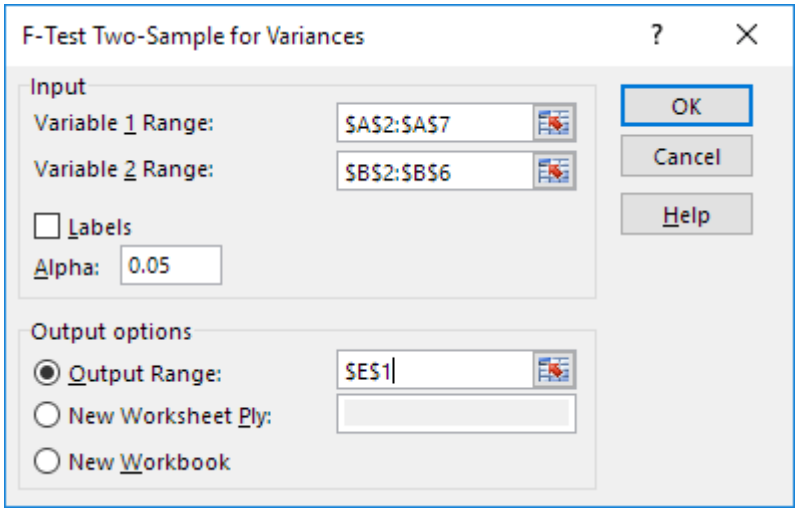
2. Select F-Test Two-Sample for Variances and click OK.



3. Click in the Variable 1 Range box and select the range A2:A7.

4. Click in the Variable 2 Range box and select the range B2:B6.

5. Click in the Output Range box and select cell E1.



6. Click OK.

Result:

E	F	G
F-Test Two-Sample for Variances		
	Variable 1	*Variable 2*
Mean	33	24.8
Variance	160	21.7
Observations	6	5
df	5	4
F	7.373271889	
P(F<=f) one-tail	0.037888376	
F Critical one-tail	6.256056502	

Important: be sure that the variance of Variable 1 is higher than the variance of Variable 2. This is the case, 160 > 21.7. If not, swap your data. As a result, Excel calculates the correct F value, which is the ratio of Variance 1 to Variance 2 (F = 160 / 21.7 = 7.373).

Conclusion: if F > F Critical one-tail, we reject the null hypothesis. This is the case, 7.373 > 6.256. **Therefore, we reject the null hypothesis**. The variances of the two populations are nok unequal. Men her ikke så klart idet P=0,037 ikke er så lille igen

5/10 Completed! Learn more about the analysis toolpak >

https://www.excel-easy.com/examples/t-test.html

t-Test: test om middelværdier er ens i to datasæt

This example teaches you how to perform a t-Test in Excel. The t-Test is used to test the null hypothesis that the means of two populations are equal.

Below you can find the study hours of 6 female students and 5 male students.

Dataark: **F-test, T-test.xlsx**

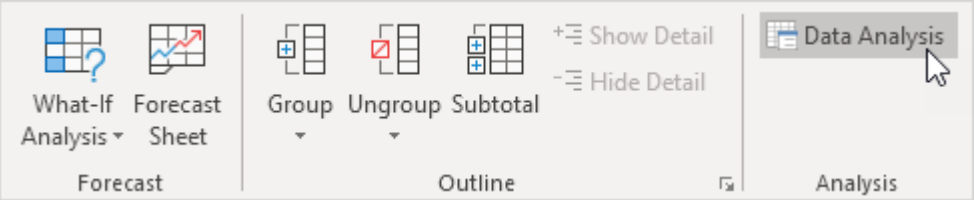
H_0: $\mu_1 - \mu_2 = 0$
H_1: $\mu_1 - \mu_2 \neq 0$

	A	B	C
1	Female	Male	
2	26	23	
3	25	30	
4	43	18	
5	34	25	
6	18	28	
7	52		
8			

To perform a t-Test, execute the following steps.

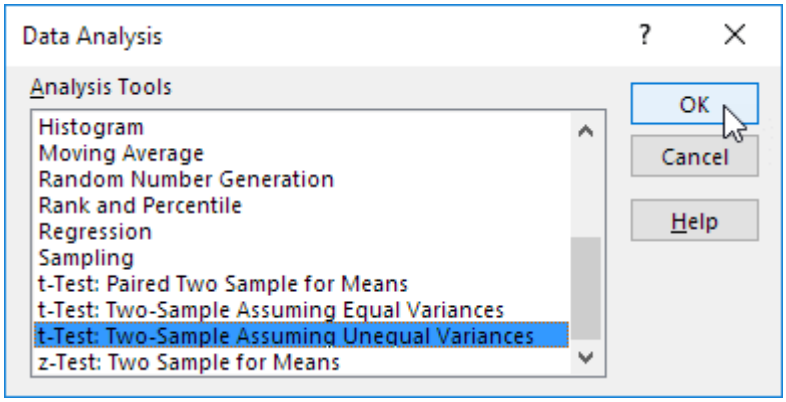
1. First, perform an F-Test to determine if the variances of the two populations are equal. This is not the case.

2. On the Data tab, in the Analysis group, click Data Analysis.



Note: can't find the Data Analysis button? Click here to load the Analysis ToolPak add-in.

3. Select t-Test: Two-Sample Assuming Unequal Variances and click OK.

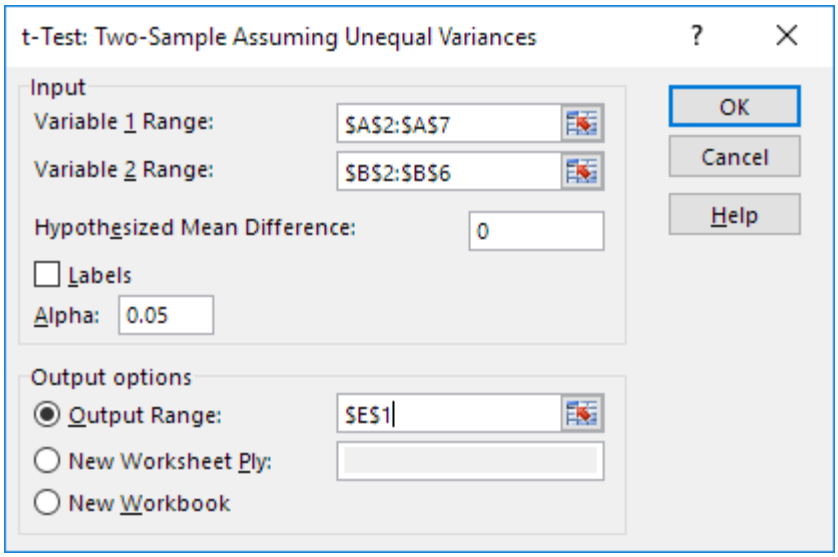


4. Click in the Variable 1 Range box and select the range A2:A7.

5. Click in the Variable 2 Range box and select the range B2:B6.

6. Click in the Hypothesized Mean Difference box and type 0 (H_0: $\mu_1 - \mu_2 = 0$).

7. Click in the Output Range box and select cell E1.



8. Click OK.

Result:

E	F	G
t-Test: Two-Sample Assuming Unequal Variances		
	Variable 1	*Variable 2*
Mean	33	24.8
Variance	160	21.7
Observations	6	5
Hypothesized Mean Difference	0	
df	7	
t Stat	1.47260514	
P(T<=t) one-tail	0.092170202	
t Critical one-tail	1.894578605	
P(T<=t) two-tail	0.184340405	
t Critical two-tail	2.364624252	

To spredninger sqrt(160)=12.6, og s2=4.5

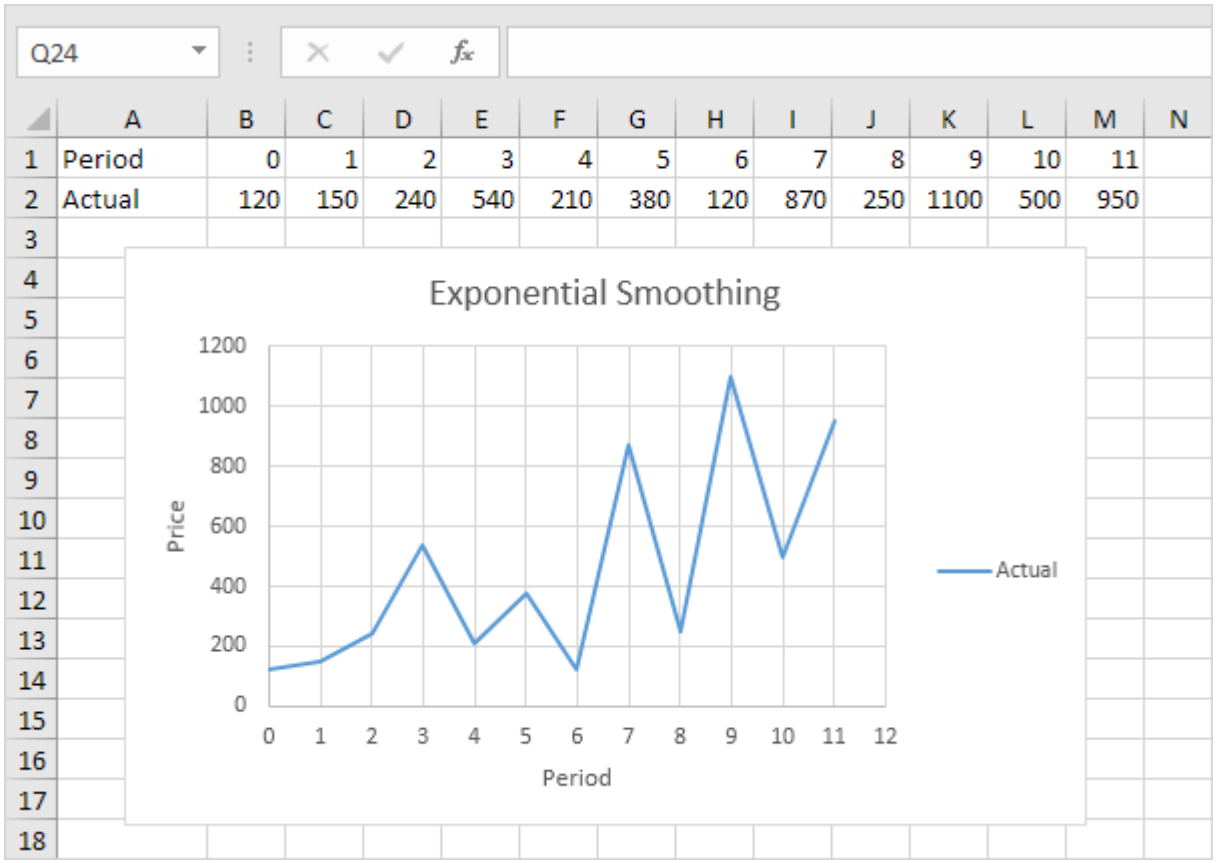
Conclusion: We do a two-tail test (inequality). If t Stat < -t Critical two-tail or t Stat > t Critical two-tail, we reject the null hypothesis. This is not the case, -2.365 < 1.473 < 2.365, og P=0.18>alfa **Therefore, we do not reject the null hypothesis.** The observed difference between the sample means (33 - 24.8) is not convincing enough to say that the average number of study hours between female and male students differ significantly.

Exponential Smoothing for a timeseries, nemmere at se trends

https://www.excel-easy.com/examples/exponential-smoothing.html

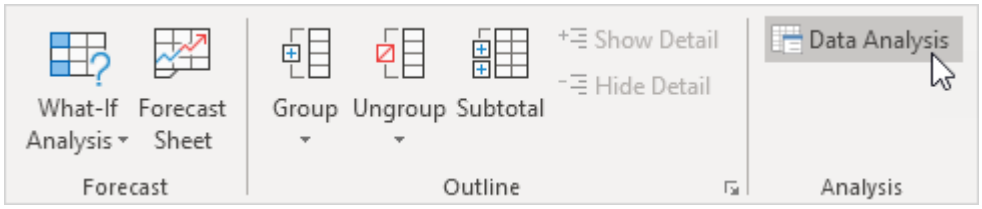
This example teaches you how to apply exponential smoothing to a time series in Excel. Exponential smoothing is used to smooth out irregularities (peaks and valleys) to easily recognize trends.

1. First, let's take a look at our time series.



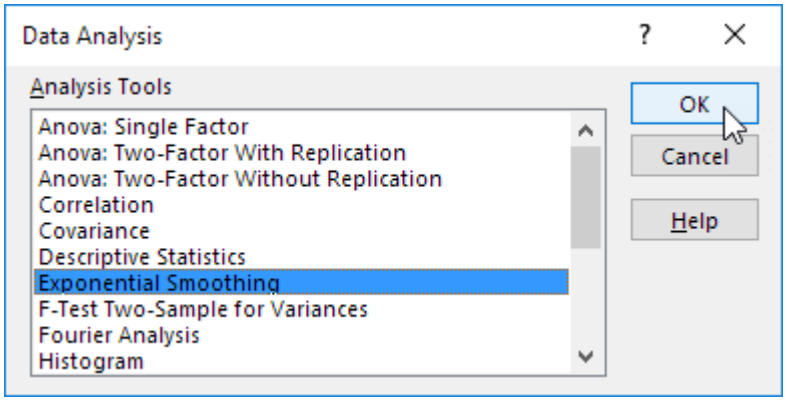
	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Period	0	1	2	3	4	5	6	7	8	9	10	11
2	Actual	120	150	240	540	210	380	120	870	250	1100	500	950

2. On the Data tab, in the Analysis group, click Data Analysis.



Note: can't find the Data Analysis button? Click here to load the Analysis ToolPak add-in.

3. Select Exponential Smoothing and click OK.

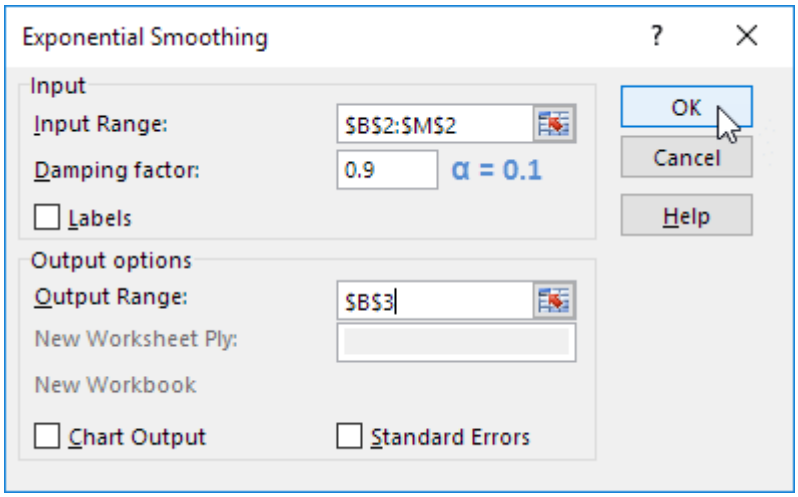


4. Click in the Input Range box and select the range B2:M2.

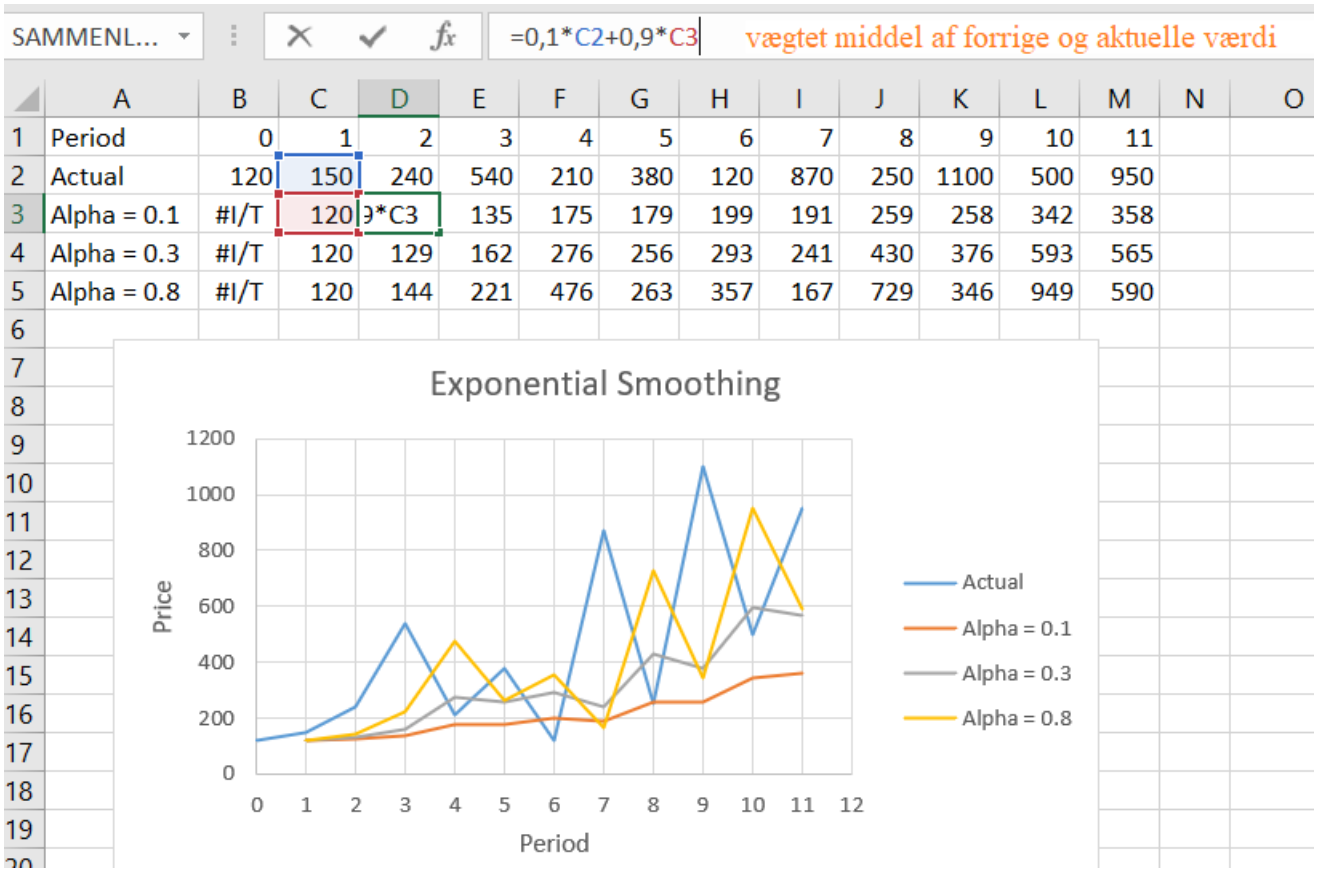
5. Click in the Damping factor box and type 0.9. Literature often talks about the smoothing constant α (alpha). The value (1- α) is called the damping factor.

6. Click in the Output Range box and select cell B3.

7. Click OK.



8. Plot a graph of these values. Der laves vægtet gennemsnit af forrige værdi og aktuelle værdi, alfa er vægten for aktuelle værdi. Alfa=1 -> værdi=aktuelle, ingen dæmpning, lille alfa -> stor dæmpning(hvor der udglattes, hvor forrige værdi har stor vægt)

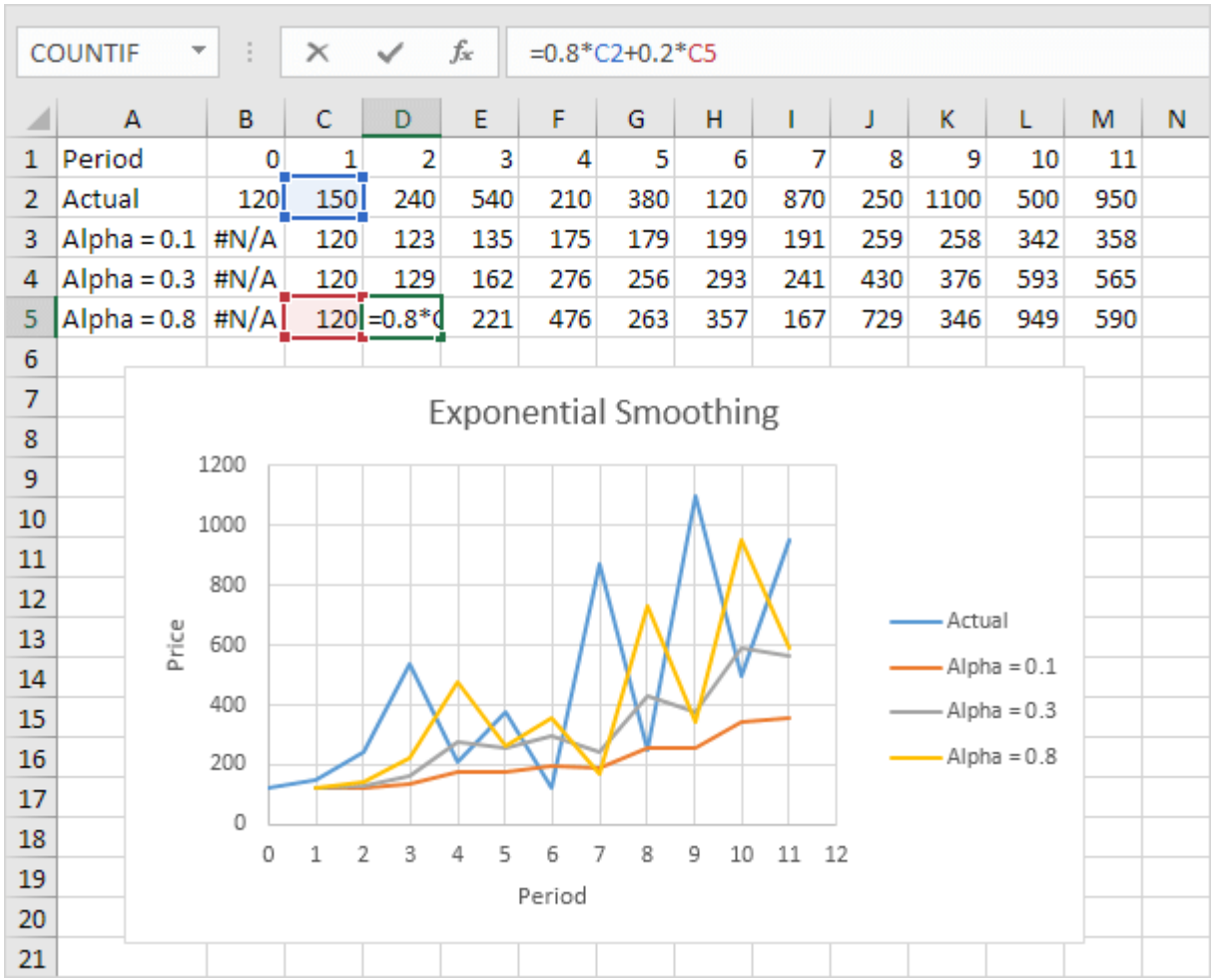


	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Period	0	1	2	3	4	5	6	7	8	9	10	11
2	Actual	120	150	240	540	210	380	120	870	250	1100	500	950
3	Alpha = 0.1	#I/T	120	ə*C3	135	175	179	199	191	259	258	342	358
4	Alpha = 0.3	#I/T	120	129	162	276	256	293	241	430	376	593	565
5	Alpha = 0.8	#I/T	120	144	221	476	263	357	167	729	346	949	590

Explanation: because we set alpha to 0.1, the previous data point is given a relatively small weight while the previous smoothed value is given a large weight (i.e. 0.9). As a result, peaks and valleys are smoothed out. The graph shows an increasing trend. Excel cannot calculate the smoothed value for the first data point because there is no previous data point. The smoothed value for the second data point equals the previous data point.

9. Repeat steps 2 to 8 for alpha = 0.3 and alpha = 0.8. $\hat{y}_i=\alpha*y_i+(1-\alpha)*\hat{y}_{i-1}$, **α=1** -> $\hat{y}_i=y_i$ ingen udglatning;

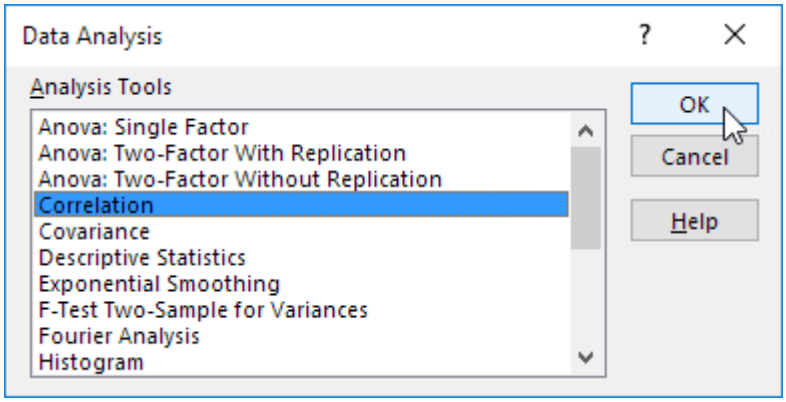
α=0(dæmpning=1): nye værdi=startværdien!



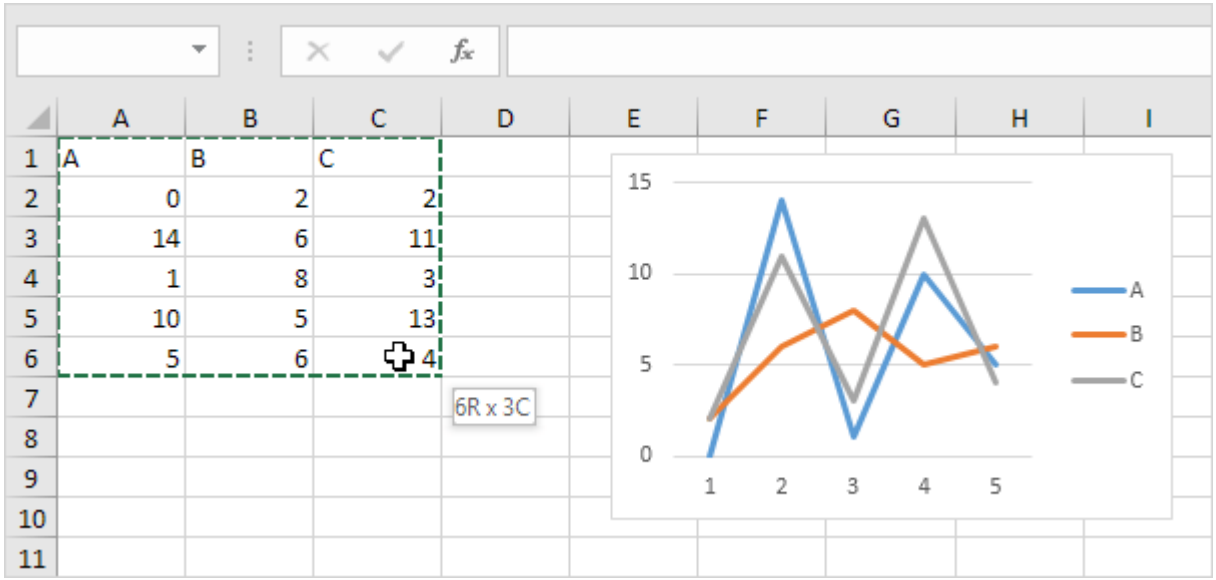
	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Period	0	1	2	3	4	5	6	7	8	9	10	11
2	Actual	120	150	240	540	210	380	120	870	250	1100	500	950
3	Alpha = 0.1	#N/A	120	123	135	175	179	199	191	259	258	342	358
4	Alpha = 0.3	#N/A	120	129	162	276	256	293	241	430	376	593	565
5	Alpha = 0.8	#N/A	120	=0.8*C	221	476	263	357	167	729	346	949	590

Conclusion: The smaller alpha (larger the damping factor), the more the peaks and valleys are smoothed out. The larger alpha (smaller the damping factor), the closer the smoothed values are to the actual data points.

Correlation mellem datasæt



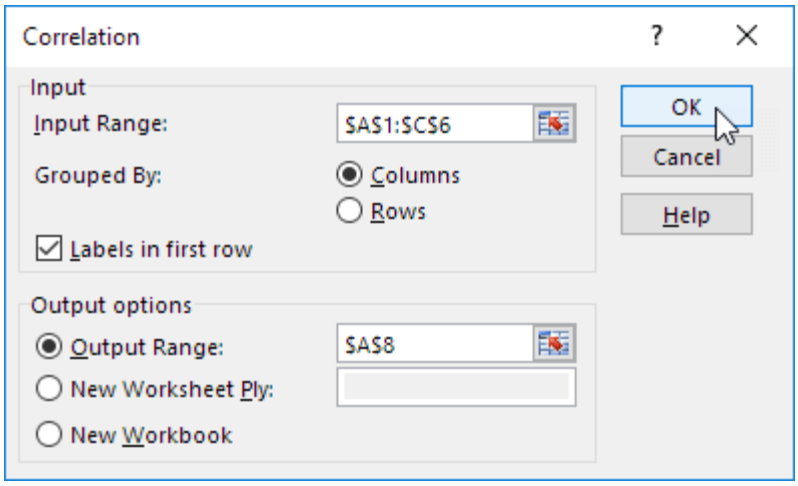
3. For example, select the range A1:C6 as the Input Range.

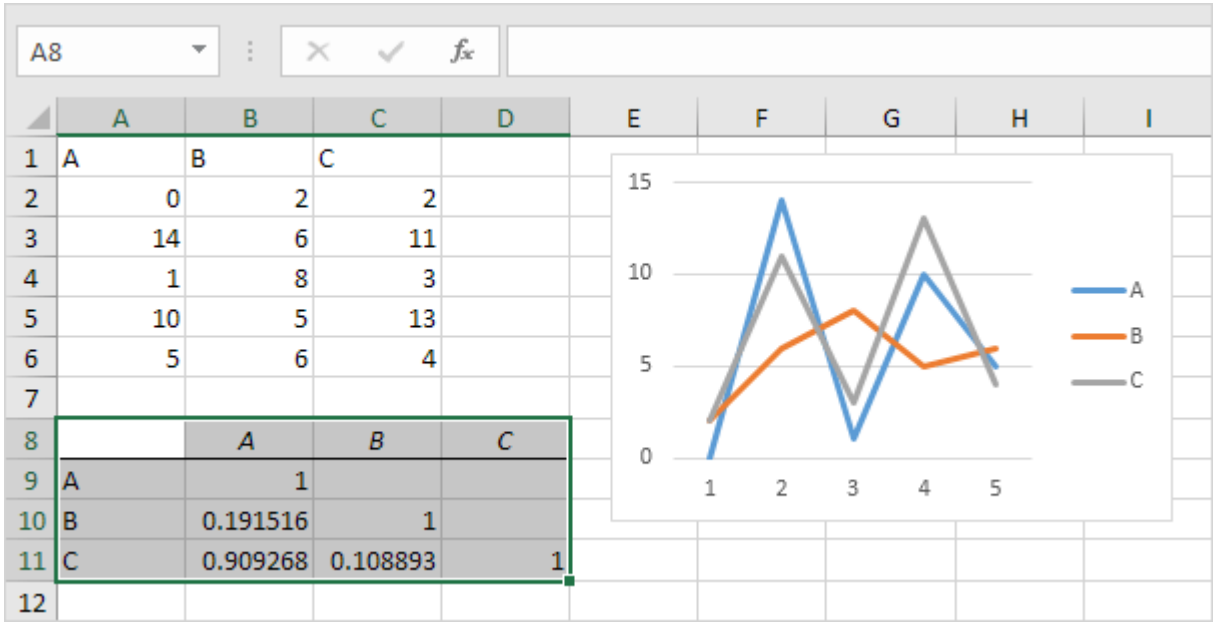


4. Check Labels in first row.

5. Select cell A8 as the Output Range.

6. Click OK.





correlation.xslx filen

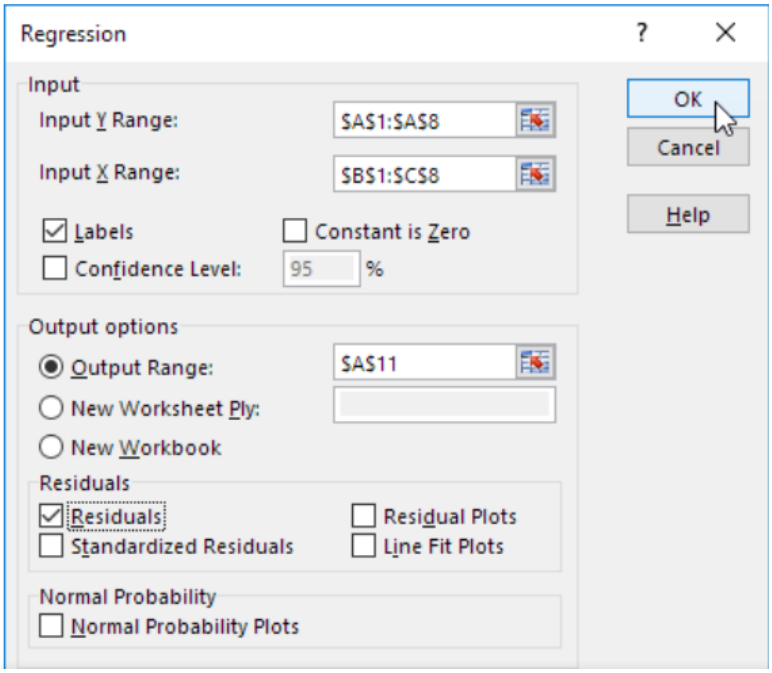
Regression, med lineær model med flere variable

This example teaches you how to run a linear regression analysis in Excel and how to interpret the Summary Output.

Below you can find our data. The big question is: is there a relationship between Quantity Sold (Output) and Price and Advertising (Input). In other words: can we predict Quantity Sold if we know Price and Advertising? regression.xlsx

-

	A	B	C	D
1	Quantity Sold	Price	Advertising	
2	8500	$2	$2,800	
3	4700	$5	$200	
4	5800	$3	$400	
5	7400	$2	$500	
6	6200	$5	$3,200	
7	7300	$3	$1,800	
8	5600	$4	$900	
9				



Significance F and P-values

To check if your results are reliable (statistically significant), look at Significance F (0.001). If this value is less than 0.05, you're OK. If Significance F is greater than 0.05, it's probably better to stop using this set of independent variables. Delete a variable with a high P-value (greater than 0.05) and rerun the regression until Significance F drops below 0.05. Ho: variable vigtig, P>alfa -> Ho forkastes-> variable ikke signifikant!

Most or all P-values should be below 0.05. In our example this is the case. (0.000, 0.001 and 0.005).

20	ANOVA						
21		*df*	*SS*	*MS*	*F*	*Significance F*	
22	Regression	2	9694299.568	4847149.784	50.269	0.001	
23	Residual	4	385700.432	96425.108			
24	Total	6	10080000.000				
25							
26		*Coefficients*	*Std Error*	*t Stat*	*P-values*	*Lower 95%*	*Upper 95%*
27	Intercept	8536.214	386.912	22.062	0.000	7461.975	9610.453
28	Price	-835.722	99.653	-8.386	0.001	-1112.404	-559.041
29	Advertising	0.592	0.104	5.676	0.005	0.303	0.882
30							

Coefficients

The regression line is: y = Quantity Sold = 8536.214 -835.722 * Price + 0.592 * Advertising. In other words, for each unit increase in price, Quantity Sold decreases by 835.722 units. For each unit increase in Advertising, Quantity Sold increases by 0.592 units. This is valuable information.

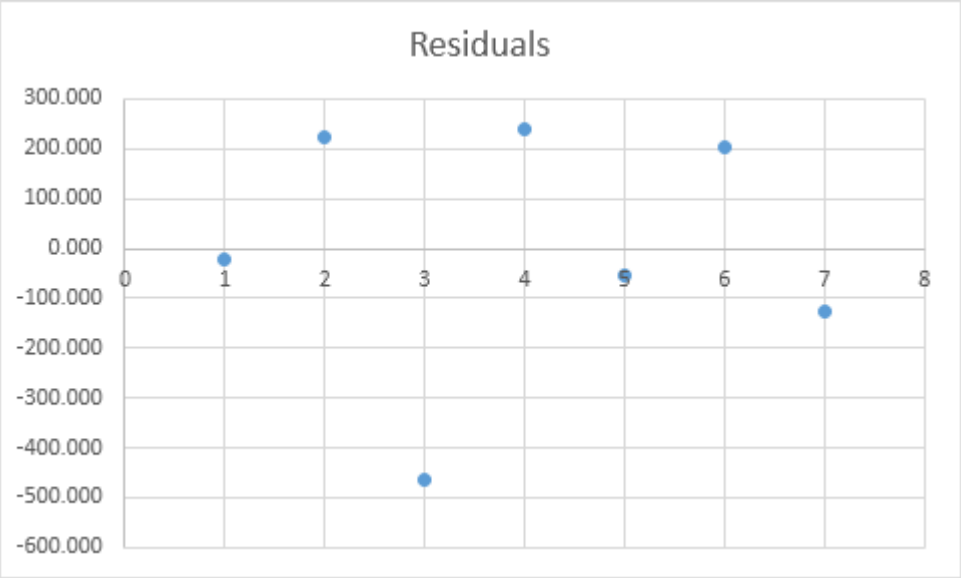
You can also use these coefficients to do a forecast. For example, if price equals $4 and Advertising equals $3000, you might be able to achieve a Quantity Sold of 8536.214 -835.722 * 4 + 0.592 * 3000 = 6970.

Residuals

The residuals show you how far away the actual data points are from the predicted data points (using the equation). For example, the first data point equals 8500. Using the equation, the predicted data point equals 8536.214 -835.722 * 2 + 0.592 * 2800 = 8523.009, giving a residual of 8500 - 8523.009 = -23.009.

33	RESIDUAL OUTPUT		
34			
35	*Observation*	*Predicted Quantity Sold*	*Residuals*
36	1	8523.009	-23.009
37	2	4476.048	223.952
38	3	6265.938	-465.938
39	4	7160.883	239.117
40	5	6252.733	-52.733
41	6	7095.058	204.942
42	7	5726.330	-126.330
43			

You can also create a scatter plot of these residuals.


Residuals
300.000
200.000
100.000
0.000
-100.000
-200.000
-300.000
-400.000
-500.000
-600.000
0
1
2
3
4
5
6
7
8

*** Slut