Excel Yourself 2017

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Introduction

This session will cover some of my Excel Yourself articles that were first published in the INTHEBLACK magazine during 2017. We will examine four of the 11 articles in the hour allotted. This is my sixth webinar covering my INTHEBLACK articles. The other five webinar recordings and materials are available for free on my website.

The workings sheets for most of the year's articles have been included in the companion file for this session.

The companion Excel sheets are arranged in date order starting with the February article on the left and working to the right to end with the December article. The green sheet tabs are the ones to be covered during the session.

The content of this manual has been re-written and adapted from the original articles and includes some extra content.

Note: I record a companion video for each month's article. You can see them all at this page

https://www.intheblack.com/topics/excel

Some of the articles include a companion file.

VERSION WARNING:

Some content in this manual will only work with certain versions. If that is the case I have put a note at the top of the section involved.

15 Years of Excel Yourself

During 2017 I reached a milestone. The first Excel Yourself article was published in October 2002, so the series has been going for more than 15 years. When the articles started Excel 2003 hadn't even been released!

New Excel Version

Excel 2018 is expected to be released later this year.

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March 2017 – XNPV Function

Versions: Excel 2007 and later

NPV = Net Present Value

Excel has a NPV function which works with regular cash flows. If you need to work with irregular cash flows then you need to use the XNPV function. This allows you to have monthly, quarterly and annual figures in the same table.

Net present value is based on the time value of money. $100 today is worth more than $100 in five years. Net present value discounts the future cash flows to today's value based on a discount rate that you provide.

Note: the NPV function in Excel differs from the common NPV definition in that it discounts the first cash flow. The XNPV function matches the common NPV definition.

The data we will use is a seven year cash flow shown in the image below.

	A	B	C	Y	Z	AA	AG	AH	AI	AJ
1		Month	Month	Month	Quarter	Quarter	Quarter	Year	Year	Year
2	**000's**	Jul-17	Aug-17	Jun-19	Sep-19	Dec-19	Jun-21	Jun-22	Jun-23	Jun-24
3	Cash Inflows	0	0	1,630	4,547	4,683	5,333	24,885	21,204	21,677
4										
5	Cash Outflow	3,000	3,000	1,455	4,189	3,964	3,879	19,233	19,911	18,864
6										
7	Net Cash Flow (NCF)	-3,000	-3,000	175	358	719	1,454	5,652	1,293	2,813
8	Cumulative NCF	-3,000	-6,000	-2,261	-1,903	-1,184	4,075	9,727	11,020	13,833
9	Progressive XNPV	-3,000	-5,988	-2,691	-2,369	-1,730	2,734	7,180	8,148	10,155

I have used grouping to hide most of the columns. You can see that the report starts out monthly then changes to quarterly and then changes to annually as we move to the right.

The dates in row 2 are all the first of the month. I have used a custom number format to display the month and year.

Syntax

XNPV(Rate,Values,Dates)

Rate - is the annual discount percentage rate to be used in the calculation. This is sometimes treated as a hurdle rate - a rate to be achieved or exceeded.

Values - is a range than contains the cashflows. Within the Values range, inflows should be shown as positive and outflows shown as negative. This range should not contain any blank cells. Blank cells result in the #NUM! error. The first value in the range is not discounted.

Dates – is a range than contains the corresponding dates for the Values range. The first date in the range must be the earliest date in the sequence and is treated as the discount date.

A positive XNPV value means that, after discounting all the future net cashflows, the value of the inflows exceeds the outflows. In general most outflows are at the start of the project eg a factory is built or shares are purchased.

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In the section below the report I have an input cell B11 for the discount rate. We will calculate the XNPV in cell B12.

	A	B
1		Month
2	**000's**	Jul-17
3	Cash Inflows	0
4		
5	Cash Outflow	3,000
6		
7	Net Cash Flow (NCF)	-3,000
8	Cumulative NCF	-3,000
9	Progressive XNPV	-3,000
10		
11	Discount Rate	5.00%
12	XNPV	10,155

The formula for cell B12 is

=XNPV(B11,B7:AJ7,B2:AJ2)

On the previous page row 9 has an XNPV function that demonstrates how the XNPV progresses as the years go by.

The formula for cell B9 is

=XNPV($B$11,$B$7:B7,$B$2:B2)

This has been copied across the rest of the columns. You can see that the last entry in row nine matches the calculated XNPV in cell B12 of 10,155.

By comparing rows 8 and 9 you can see the cumulative raw values compared to the discounted values.

Internal Rate of Return

Closely related to the NPV calculation is the concept of an internal rate of return - IRR. The internal rate of return is the annual interest rate that provides a zero NPV.

Just a note on calculating IRR. It is possible to have multiple IRR's if you have positive and negative cash flows throughout the life of the project.

Excel has a IRR function that works with regular cash flows. There is also an XIRR function that works with irregular cash flows.

Syntax

XIRR(Values,Dates,Guess)

The **Values** and **Dates** arguments mean the same as the XPNV function.

Guess – this is an optional argument - you can supply a rate you think is close to the rate that will be achieved. If omitted 0.1 (10%) is used. Excel will start with this rate and will iterate 100 times attempting to find a rate that achieves a zero XNPV.

I have added two extra cells to look at the XIRR. The formula in cell B13 is

=XIRR(B7:AJ7,B2:AJ2)

	A	B
1		Month
2	**000's**	Jul-17
3	Cash Inflows	0
4		
5	Cash Outflow	3,000
6		
7	Net Cash Flow (NCF)	-3,000
8	Cumulative NCF	-3,000
9	Progressive XNPV	-3,000
10		
11	Discount Rate	5.00%
12	XNPV	10,155
13	XIRR	34.20835196972%
14	XNPV - Check XIRR	-0.0001

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As a check I have added a formula to cell B14 to see if the rate that the XIRR generates does in fact give us a zero NPV. The formula in cell B14 is.

=XNPV(B13,B7:AJ7,B2:AJ2)

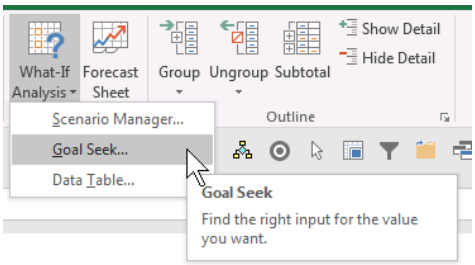
	A	B
1		Month
2	**000's**	Jul-17
3	Cash Inflows	0
4		
5	Cash Outflow	3,000
6		
7	Net Cash Flow (NCF)	-3,000
8	Cumulative NCF	-3,000
9	Progressive XNPV	-3,000
10		
11	Discount Rate	5.00%
12	XNPV	10,155
13	XIRR	34.20835196972%
14	XNPV - Check XIRR	-0.0001
15	Goal Seek - entered	1.00000%
16	XNPV - Goal Seek XIRR	13013.6511264534

Iterations

The XIRR function starts with a rate of 10%. It uses trial and error to find a rate that returns a zero NPV. It will go through 100 iterations to arrive at the zero NPV. If you need more iterations then you can use Excel's built-in Goal Seek feature.

Goal Seek

I have added two more cells to demonstrate how we can use Goal Seek to arrive at an IRR.

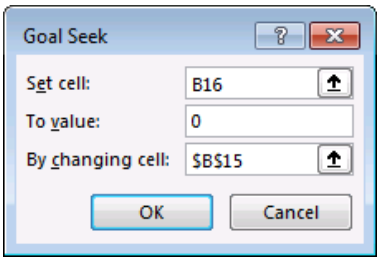


Note: this is a manual operation.

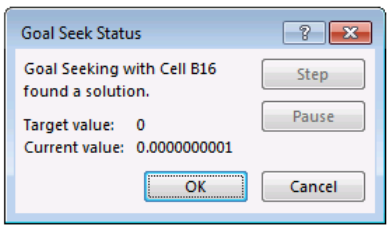
Click on cell B16

Click on the What-If Analysis drop down in the Data ribbon.

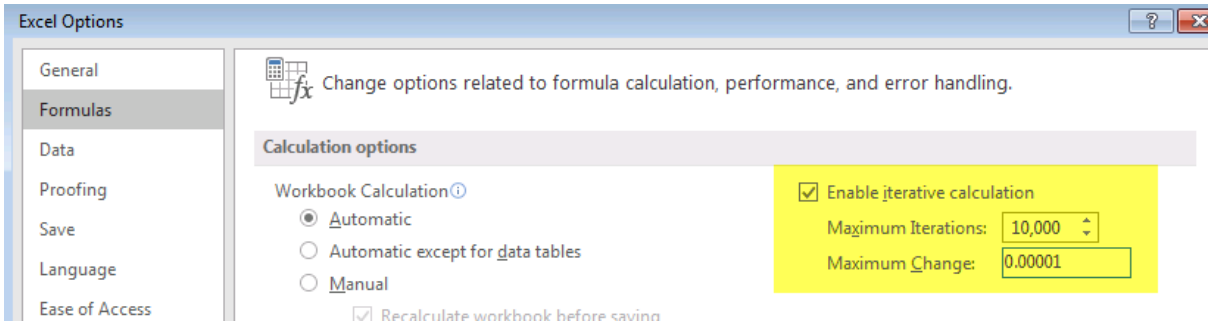
In the Goal Seek dialog set the To value to 0 and the By changing cell entry to cell B15. Click OK.
The result is shown below.



10		
11	Discount Rate	5.00%
12	XNPV	10,155
13	XIRR	34.20835196972%
14	XNPV - Check XIRR	-0.0001
15	Goal Seek - entered	34.20835%
16	XNPV - Goal Seek XIRR	0.0000000001
17		



This result is based on the Excel Options shown below.



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April 2017 – Moving Annual Totals

Versions: Excel 2007 and later

Moving Annual Totals (MATs) are a good way to smooth out seasonal variations when looking at long term data. In the table below we will use the SUMIFS function and a few date hacks to allow us to calculate the annual totals for each month in each year. The data in columns A and B includes years 2014 to 2017.

	A	B	C	D	E	F	G
1	**Date**	**Amount**		**MAT**	2015	2016	2017
2	1/01/2014	14,651		January			
3	2/01/2014	18,757		February			
4	3/01/2014	15,285		March			
5	4/01/2014	18,693		April			
6	5/01/2014	18,405		May			
7	6/01/2014	15,567		June			
8	7/01/2014	16,314		July			
9	8/01/2014	17,651		August			
10	9/01/2014	15,262		September			
11	10/01/2014	10,448		October			
12	11/01/2014	12,419		November			
13	12/01/2014	19,866		December			
14	13/01/2014	12,668					

The value we want to show in cell E2 is the annual sales from 1/2/2014 to 31/1/2015. As we copy this down and across we will get the annual sales for the end of each month in each of the years.

SUMIFS Function

The SUMIFS function allows us to do multi-criteria summing based on ranges. In our case we need to add up all of the amounts in column B based on the dates in column A. We will use two dates to specify the start and the end dates.

Syntax

SUMIFS(Range_to_Sum, CriteriaRange_1, Criteria_1, CriteriaRange_2, Criteria_2, ….)

Range_to_Sum – this is the range that contains the values that will be added up. It can be a whole column or a whole row.

CriteriaRange - This is the range that contains the criteria is to be examined. It should line up exactly with the **Range_to_Sum**. Each criteria range needs a criteria. These are paired up as you move to the right in the function. You can have up to 64 criteria ranges. Between two and four are the most common.

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Criteria - This is the value to be looked for in the corresponding **CriteriaRange**. When the criteria is found in the **CriteriaRange** the corresponding value in the **Range_to_Sum** is added up. You can use greater than or less than comparisons, but you need to include them in quotation marks and join them using the & symbol with your criteria. Our example will demonstrate this.

The formula in cell E2 that can be copied across and down is

=SUMIFS($B:$B,$A:$A,"<="&EOMONTH($D2&E$1,0),$A:$A,">="&EOMONTH($D2&E$1-1,0)+1)

We are adding up column B referring to the whole column with $B:$B.

The first criteria range is column A

$A:$A

The criteria is

"<="&EOMONTH($D2&E$1,0)

In Column A we want the date less than or equal to 31/1/2015.

To use less than or equal to we must enclose the symbols in quotation marks and use the & symbol to join them to the front of the date which is provided by the EOMONTH function.

The EOMONTH function provides the end of month date for a particular date. We have used a date hack to provide the date for the EOMONTH function.

Syntax

EOMONTH(Date,Number of months)

Date – usually a reference to a cell that contains a date. Can be a formula that returns a date.

Number of months – the number of months to add to the date to then get the end of month. Zero means the end of month for the **Date**.

Date Hack

If you type Jan17 into a cell Excel will convert that into the 1/1/2017. We can use that functionality to create a date for the EOMONTH function to use for the end date in our criteria even though we don't have a date in our report.

In EOMONTH function the date we have used is $D2&E$1. This combines the month name (D2) and the year (E1). Excel will convert that combination into 1/1/2015. Because we used zero at the end of the EOMONTH function Excel will provide us with the end of January 2015 or 31/1/2015.

The second criteria range also uses column A again and the second criteria is

">="&EOMONTH($D2&E$1-1,0)+1

In this case we want the date greater than or equal to 1/1/2014.

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First of the Month Date Hack

The EOMONTH function provides the end of the month. To get the first of a month we can hack this by figuring out the end of the previous month and adding one to it as below.

EOMONTH($D2&E$1-1,0)+1

The above formula works out the end of the month for January 2014 (note it deducted 1 from the value in cell E1). Then 1 is added to the EOMONTH result to give us 1/2/2014 – the date we want.

Another Date Hack

One of my most popular blog posts shows how to convert the text month name into the month number.

If you type 1Jan into a cell Excel will convert that into 1 Jan in the current year. So if cell J1 contains a text month name then the following formula will return the month number

=MONTH(1&J1)

To get the Financial year month number (Jul = 1 and June =12) use

=MONTH(1&J1)+IF(MONTH(1&J1)>6,-6,6)

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May 2017 – Advanced Filter Macro

When you record macros Excel typically captures the ranges that you select. This means that the macros that you create are not necessarily flexible. To convert your macros into dynamic flexible macros we can amend the recorded macro code to provide the flexibility. There are a couple of techniques that we will examine.

In the example from the article we are going to record a macro to apply advanced filter. We will then amend the recorded code to make it more flexible.

Advanced Filter

Advanced filters allow you to apply more complex filters than you can apply with the auto filter feature in Excel.

For example in the image on the right we can apply a filter that will display all of the males OR anyone with a middle initial K. Using separate rows for the entries instructs Excel to use the OR combination.

This type of filter is not possible with the filter drop downs that you see in tables.

	A	B	C	D	E	F
1	**Number**	**Gender**	**GivenName**	**MiddleInitial**	**Surname**	
2		male				
3				K		
4						
5						
6						
7						
8						
9						
10						
11	**Number**	**Gender**	**GivenName**	**MiddleInitial**	**Surname**	
12	1	male	Joseph	S	Karloan	
13	2	male	Joshua	D	McDonnell	
14	3	male	Jett	I	Baume	
15	4	female	Keira	I	Downie	
16	5	male	Tyson	S	Koch	

Advanced filters require a criteria area which, in the image above, is A1:E9. Typically this is placed above the data that is to be filtered. You need to make sure that the heading names that you use in the criteria range are identical to the headings that are in your data.

In the structure above an important feature is the blank row in row 10. This separates the criteria range from the data which is to be filtered. When Excel estimates ranges it stops at blank rows and blank columns by using a blank row we make sure that the criteria range doesn't overlap with the data range.

When applying advanced filters it is best to select a cell within the data before you start. That way Excel will automatically guess the correct data range to filter. **Note:** your data range should **NOT** have any blank rows or blank columns.

1. Select cell A11.

2. Press the following keys in sequence (don't hold them down) Alt T M R this will start the macro recorder. The macro recorder writes code to match your actions. This code can then be "replayed" to perform the actions again.

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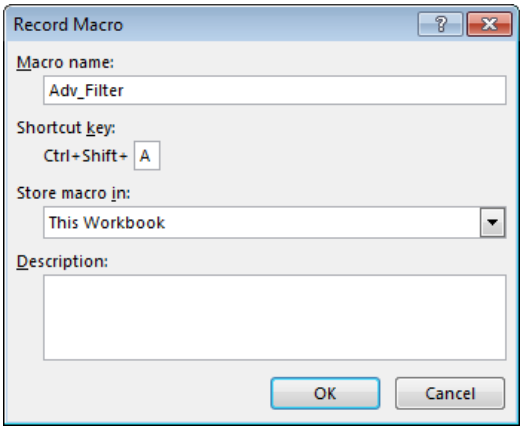
3. In the Macro name box type Adv_Filter. Spaces are not allowed in macro names. Click in the Shortcut key box and hold the Shift key down and press A. This will allow you to use Ctrl + Shift + A to run the macro. In the Store macro in drop down make sure the This Workbook option is selected and click OK.

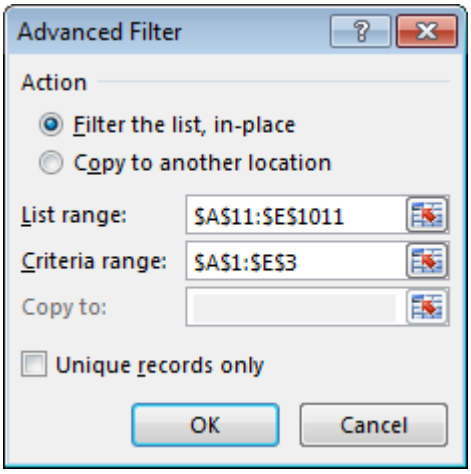


4. Click the Data ribbon tab and then click the Advanced icon in the middle of the ribbon.

   The correct range for the data should have already been entered in the List range box.

   Click in the Criteria range box and then scroll to the top of the sheet and select the range A1:E3 and click OK.

   The filter is applied (note the blue row numbers, these mean a filter is in place).



5. Press in sequence Alt T M R to stop the macro recorder.

Always remember to stop recording your macros, otherwise you end up with a lot of extra code.

Test the macro is working by changing the K to a J. Hold the Ctrl and Shift keys down and press A.

All Males and only those Females with a middle initial J should be visible. This worked because the ranges hadn't changed.

Below is the Macro code. Press Alt + F11 to open the VBA window.

```
Sub Adv_Filter()
'
' Adv_Filter Macro
'
' Keyboard Shortcut: Ctrl+Shift+A
'
    Range("A11:E1011").AdvancedFilter Action:=xlFilterInPlace, CriteriaRange:= _
        Range("A1:E3"), Unique:=False
End Sub
```

Note: the ranges are hard-coded into the macro. We must replace those hard-coded ranges with a flexible alternative.

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Excel has a feature called current region. You can access it by pressing Ctrl + * (Ctrl + Shift + 8 if you don't have a numeric keypad). This selects the range around the current cell or range. Excel stops at blank rows and blank columns.

The amended code is shown below – the changed code is in yellow. It uses two anchor cells A1 and A11 to be the top left corners of the two ranges required.

```
Sub Adv_Filter()
'
' Adv_Filter Macro
'
' Keyboard Shortcut: Ctrl+Shift+A
'
    Range("A11").CurrentRegion.AdvancedFilter Action:=xlFilterInPlace, CriteriaRange:= _
        Range("A1").CurrentRegion, Unique:=False
End Sub
```

This code will work if the data range expands or extra entries are made to the criteria range.

Flexible recorded macros

You can make your recorded macros more flexible by using a special technique when recording macros. When recording macros to be more flexible is important to select the range you want to work with before you start recording. If you select the range after you start recording then, as in our example above, Excel will record the actual range that you select and that will be hard coded into the VBA code. When you select the range before you start recording then Excel will use the keyword called Selection this makes the macro more flexible.

As an example we will record a macro to apply the red font colour to a range.

1. Select cell A11.
2. Press in sequence Alt T M R.
3. Type Red_Font in the Name box and make sure This Workbook is showing in the Store macro in drop down. Click in the Shortcut key box and the hold the Shift key down and press R. Click OK.
4. Press Ctrl + * and then apply the red font colour.
5. Stop the macro using Alt T M R.

```
Sub Red_Font()
'
' Red_Font Macro
'
' Keyboard Shortcut: Ctrl+Shift+R
'
    Selection.CurrentRegion.Select
    With Selection.Font
        .Color = -16776961
        .TintAndShade = 0
    End With
End Sub
```

Shortcut keys

Two shortcuts key combination I use a lot are

Alt A C - these are pressed in sequence, not held down. This clears all filters.

Ctrl +Shift + L - a toggle that either applies or removes the Filter icons on a table.

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December 2017 – TEXTJOIN and CONCAT Functions

Versions: Excel 2016 and later (note some versions of Excel 2016 don't have these functions)

Not all versions of Excel are created equal. These functions are available in the subscription version of Office 365 if you have set up your version to update automatically. No doubt they will appear in Excel's next version Excel 2018 which is due out later this year. Just be aware that the subscription version can have more features and functions than the standard installation of Office.

Two new functions in Excel are the CONCAT and the TEXTJOIN functions. These allow you to join text together much more easily than previous versions. Excel's previous techniques of joining text together did not allow you to join a range of text entries together. These two new functions allow you to do that.

In the article I covered a few uses of joining a range of text together.

In the past you used to use the CONCATENATE function or the & symbol to join text together you can see an example of both in the image below.

	A	B	C	D
1	**First Name**	**Last Name**	**Formula**	**Formula in column C**
2	John	Smith	John Smith	=CONCATENATE(A2," ",B2)
3	Sue	Tan	Sue Tan	=A3&" "&B3

This is not scalable. Every extra word requires an extra entry in the formula. By the way I don't use the CONCATENATE function I only use the & symbol.

CONCAT Function

The CONCAT Function is the easiest of the new functions to use. It just requires a range. You can see an example of it on the right.

	A	B	C	D	E
1	**Part 1**	**Part 2**	**Part 3**	**Code**	**Formula in column D**
2	ABC-	123-	DEF	ABC-123-DEF	=CONCAT(A2:C2)
3	ABC-	124-	DEF	ABC-124-DEF	=CONCAT(A3:C3)

The entries in all of the cells are simply joined together. If you need to place a space or other character between the entries then you would need to include them in the cells within the range.

TEXTJOIN Function

This function is more flexible as it allows you to specify a delimiter that is placed between all the cell entries and the ability to ignore empty cells.

Syntax

TEXTJOIN(Delimiter,Ignore_Empty,Text1,[Text2]…)

Delimiter – a text string to placed between each cell's text. Typically this is a space. You must enclose the text in quotation marks. The delimiter can be more than one character.

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Ignore_Empty – you enter TRUE to ignore empty cells and FALSE to include empty cells. You can use 1 for TRUE or 0 for FALSE. Using FALSE (0) works like CONCAT.

Text1, Text 2 – this is the range that has the text to join. You can include multiple ranges separated by commas.

You can see examples of using the various arguments in the image below.

	A	B	C	D	E
1	**First**	**Middle**	**Last**	**Full Name**	**Formula in column D**
2	John	David	Smith	John David Smith	=TEXTJOIN(" ",1,A2:C2)
3	Sue	Lee	Tan	Sue Lee Tan	=TEXTJOIN(" ",1,A3:C3)
4	Kelly		Jones	KellyJones	=TEXTJOIN("",1,A4:C4)
5	Bono			Bono	=TEXTJOIN(" ",1,A5:C5)
6		Bono		Bono	=TEXTJOIN(" ",1,A6:C6)
7			Bono	Bono	=TEXTJOIN(" ",0,A7:C7)
8	John	David	Smith	JohnDavidSmith	=TEXTJOIN("",0,A8:C8)

In most cases you would set the ignore entry option to 1.

Sentences

The TEXTJOIN function can simplify sentence creation as it can automatically add spaces between the words or phrases.

The image on the right provides a simple example of creating a sentence.

	A	B	C	D	E	F
1		**Month**		**Dec-17**	**Month $**	**YTD $**
2	Text	The		Revenue	123,456	802,464
3	Formula	loss		Cost	136,587	546,348
4	Text	for the month of		**Profit/(Loss)**	**(13,131)**	**256,116**
5	Formula	December 2017				
6	Text	was				
7	Formula	$13,131				
8						
9	Sentence: The loss for the month of December 2017 was $13,131.					

The formula in cell B9 is

=TEXTJOIN(" ",1,B2:B7)&". "

There are formulas in some of the cells in the range B2:B7 see below.

Cell	Formula	Description
B3	=IF(E4>=0,"profit","loss")	Value in E4 determines whether profit or loss is displayed
B5	=TEXT(D1,"mmm yy")	Converts the date into text.
B7	=DOLLAR(ABS(E4),0)	DOLLAR formats the number correctly. ABS removes the minus sign if necessary.

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Codes

The TEXTJOIN function simplifies joining parts of a code together.

The formula in cell D2 has been copied down, it is

=TEXTJOIN("-",1,A2:C2)

	A	B	C	D
1	**Part_1**	**Part_2**	**Part_3**	**TEXTJOIN**
2	123	456	789	123-456-789
3	124	457	789	124-457-789
4	125	458	789	125-458-789
5	126	459		126-459

When combining text from a range, the CONCAT function is simple to use. The flexibility of the TEXTJOIN function provides more opportunities to automate

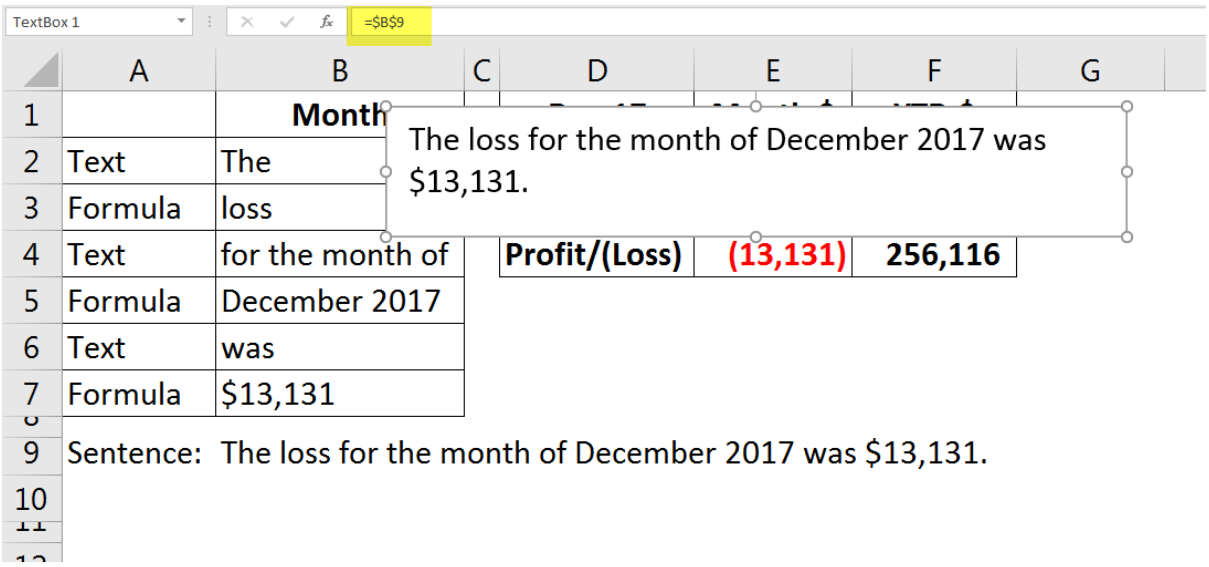
- Report headings
- Journal narrations
- Descriptive text
- Code creation
- Names and addresses
- Instructions

Once you have created a text string you can copy it to Word or PowerPoint.

TextBoxes

You can also link text to a textbox.

Simply draw the textbox and when it is selected click in the formula bar and press = and then click the cell to link to – as per image below.



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