

MS Excel – a Versatile Computer Aided Audit Tool

*It's good to know many things, but it is always better.....
..... to make best use of whatever little you know – Anonymous*

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MS Excel – a CAAT

MS Excel software needs no introduction; it's a simple application which most of us use every day -time-in and out. The versatile spreadsheet is available almost on all machines and seldomly one will find an accountant / auditor not using it. While mostly it is popular for making statements, charts, etc., it can conveniently be also used as CAAT. This article is to facilitate to make best use of whatever little is known by user about MExcel.

Some of the important MExcel-functions that are useful as CAAT for audit / investigation are described below.

- 'IF'
- 'IF' in combination with 'AND'
- 'IF' in Combination with 'AND' & 'OR'
- 'CountIF' and 'SUMIF'
- 'SUMIFS'
- 'VLOOKUP'
- Pivot Table Function
- Formula Auditing

Note : The above list is not exhaustive but is only an illustrative one. There are many other useful functions and the users may develop skills once he/she starts practicing them. Also it needs to be noted that there are several ways in MS Excel to achieve the same results; therefore this article attempts to only explain a few of them.

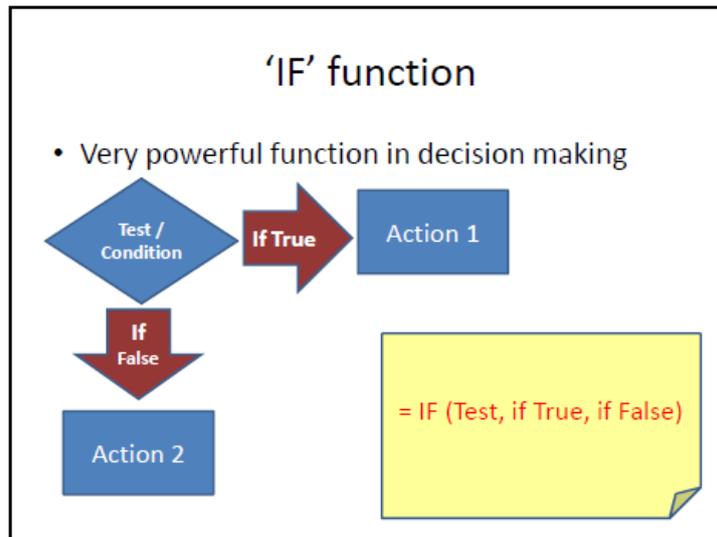
The above functions are explained in detail with its corresponding application in audit / fraud investigations.

The 'IF' Function

The IF Function along with its derivative usage with 'AND' / 'OR' can be useful for:

- Detecting Gaps
- Finding Duplicates
- Locating Multiple Records
- Flagging Records
- Ageing Analysis or Advance Analysis
- Extracting Records meeting certain criteria (Combination with filter commands or with Pivot Table commands)

The 'IF' function is very powerful element in decision making. The function can be simply explained as follows :



The Syntax of 'IF' function :

= IF (Test, if True, if

Example of 'IF' Function :

The given data is list of cheques issued and the objective is to determine gaps of missing cheque numbers.

Step 2 : Use 'IF' function to determine Gaps

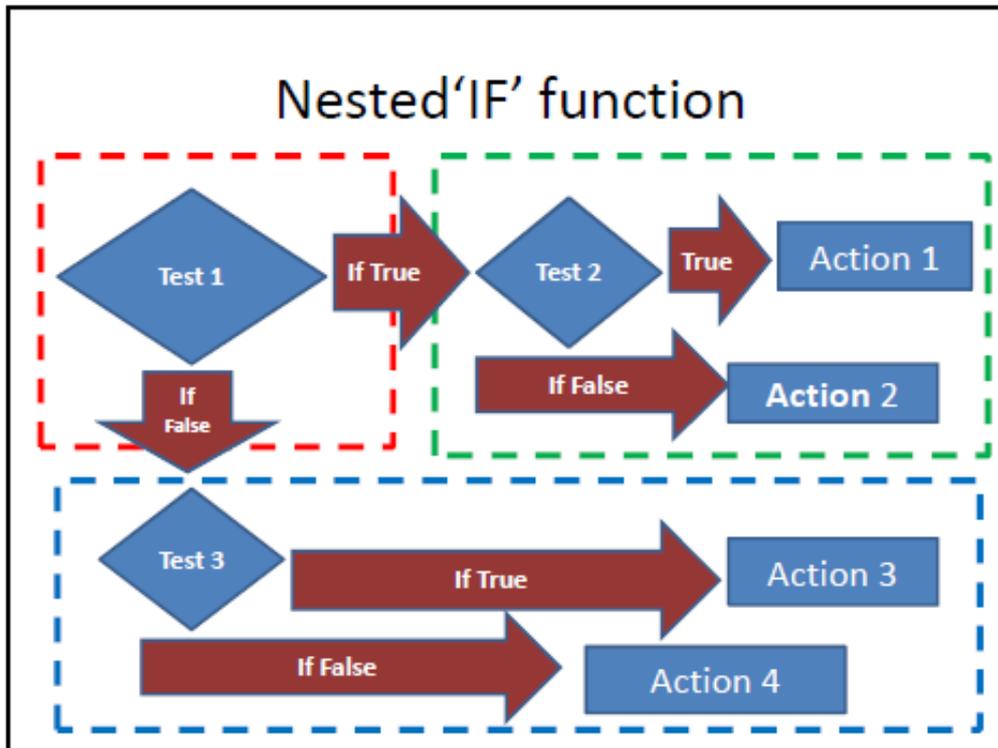
=IF(C24-C23=1,"","Missing")

| Date | Bank | Chq No. | Name | Amount Rs | Chq Missing | Chq Misse |
|-------------|------|---------|---------------------------|-----------|-------------|-----------|
| 3-Dec-2009 | | 103401 | Amcol Engineering Stores | 172,800 | | |
| 3-Dec-2009 | | 103402 | Shakti Auto Works | 151,296 | | |
| 3-Dec-2009 | | 103403 | R.P Merchant | 48,640 | | |
| 3-Dec-2009 | | 103404 | H.S.Enterprise(H.U.F.) | 332,800 | | |
| 4-Dec-2009 | | 103405 | Sohil Trading Co. | 148,595 | | |
| 4-Dec-2009 | | 103407 | Swastic Hardware Mart | 117,760 | Missing | 103406 |
| 4-Dec-2009 | | 103408 | Shree Laxmi Narayan Entp. | 96,000 | | |
| 4-Dec-2009 | | 103409 | Pareen Enterprise | 122,112 | | |
| 5-Dec-2009 | | 103410 | Sohil Trading Co. | 610,304 | | |
| 5-Dec-2009 | | 103411 | Rajesh Enterprises | 189,696 | | |
| 5-Dec-2009 | | 103412 | H.S.Enterprise(H.U.F.) | 207,360 | | |
| 9-Dec-2009 | | 103414 | Saurin Enterprise | 173,568 | Missing | 103413 |
| 9-Dec-2009 | | 103415 | Swastic Hardware Mart | 172,186 | | |
| 9-Dec-2009 | | 103416 | H.N.Shah & Co. | 448,000 | | |
| 9-Dec-2009 | | 103417 | Ambica Enterprises | 143,360 | | |
| 9-Dec-2009 | | 103419 | Technoweld | 251,136 | Missing | 103418 |
| 10-Dec-2009 | | 103420 | Amcol Engineering Stores | 330,752 | | |

For complex operations, another 'IF' function can be used within an 'IF' function. This is known as Nested-IF function which is explained as follows :

The Nested 'IF' functions – that is using IF within IF Function.

Here we use multiple tests (queries/ questions) in serial order and depending upon the response of preceding test another logical test follows. The nested-IF function can be explained as follows:



Syntax of Nested IF

= IF (Test1, IF(Test2,if True, if False), IF (Test 3, If True, If False))



= IF (Test1,
 → if true IF [Test2, if true,if false],
 → if false IF [Test 3, if true, if false]
)

There can be maximum of 64 nested 'IF's

Example of Nested-IF function

The given data is list of sales team with their date of joining, years of experience and sales achieved during a period. A salesman is entitled to promotion depending upon his/her experience and sales achieved. If his experience is under 3 years, he/she is eligible if the sales are over \$ 3mn and for others the eligibility sales criteria is \$ 5mn. The objective is to flag 'Eligible' status in Col-F

Nested 'IF' Function.

Data of Employees with Sales

Eligible for Promotion if

Exp over 3 yrs --> Sales Over \$ 5mn

Exp under 3 yrs --> Sales Over \$ 3mn

Formula: =IF(D7>3,IF(E7>5000000,"Eligible","-----"),IF(E7>3000000,"Eligible","-----"))

Breakdown:

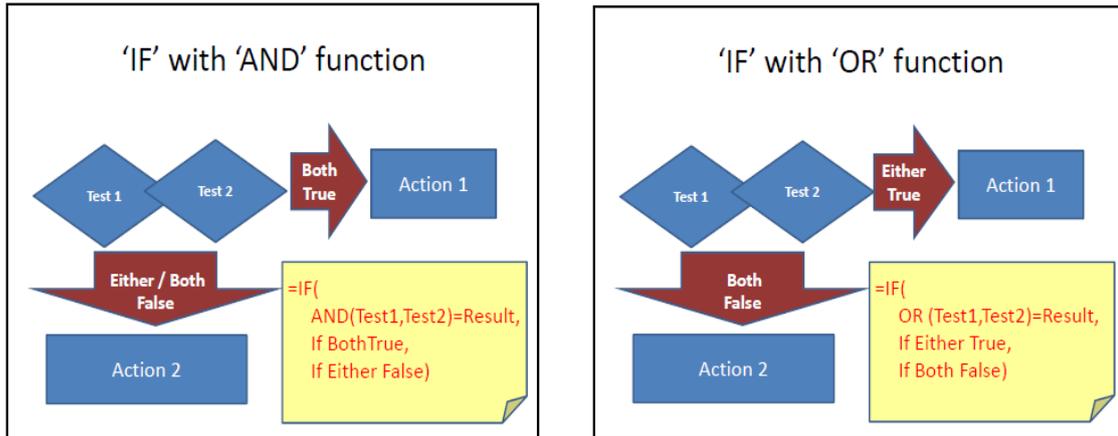
- Test 1: =IF(D7>3, ...)
- Test 2: IF(E7>5,000,000,"Eligible","-----") If true
- Test 3: IF(E7>3000000,"Eligible","-----") If False

| Name | DOJ | Experience | total | Promotion |
|--------------|-----------|------------|-----------|-----------|
| 1 Amar | 27-May-02 | 8.00 | 8,167,500 | Eligible |
| 2 Divya | 1-Jul-02 | 8.00 | 2,747,250 | ----- |
| 3 Ghansham | 1-Jun-06 | 4.00 | 5,821,200 | Eligible |
| 4 Giri | 20-Jun-06 | 4.00 | 4,826,250 | ----- |
| 5 Girish | 15-Jun-06 | 4.00 | 6,341,250 | Eligible |
| 6 Hiten | 15-Jul-02 | 8.00 | 4,826,250 | ----- |
| 7 Irfan | 1-Sep-06 | 4.00 | 4,083,750 | ----- |
| 8 James | 1-Nov-06 | 4.00 | 4,158,000 | ----- |
| 9 Jeetu | 1-Dec-06 | 4.00 | 4,826,250 | ----- |
| 10 Mandar | 28-Mar-07 | 3.00 | 3,281,250 | Eligible |
| 11 Mangaldas | 14-Mar-07 | 3.00 | 1,782,000 | ----- |
| 12 Manv | 30-Jan-06 | 4.00 | 6,335,000 | Eligible |
| 13 Mithun | 1-Dec-06 | 4.00 | 6,682,500 | Eligible |
| 14 Nikhil | 27-Aug-07 | 3.00 | 2,004,750 | ----- |

The Eligible and Not-Eligible employees can be filtered separately to check with the promotions given.

Using 'IF' function in combination with 'AND' / 'OR'

Sometimes we need to have two or more tests that needs simultaneous confirmation for logical actions, this can be done by using the 'AND' or 'OR' with the 'IF' function. These results can also be achieved using the Nested-IF functions, however sometimes it may be easier to use 'AND'/'OR' functions. The 'IF' in combination with 'AND'/'OR' are explained below :



Syntax of 'IF' function used in combination with 'AND'

=IF(AND(Test1,Test2)=Result,If True,If False)

Example of 'IF' function used in combination with 'AND' :

The given data is a list of payments stating details of cheque nos., bills reference (against which the payments are made) and the name of vendor with the amounts. Here in order to establish multi-payments, one needs to compare the vendor names and the bills numbers. When there is a match for both criteria (Name and Bill No.) then the double payment flag is set.

G27 fx =IF(AND(E27=E28,D27=D28)=TRUE,"Dbl Pymnt","")

1 **'IF' Function.....combination with "AND"**

2

3 =IF(AND(Test1,Test2)=Result,If True,If False)

4

5 Double Payments

6 Step 1: Sort Data at two levels....

7 first on Partyand next on Bill Nos

8

9 Step 2 : Use 'IF' and 'AND' function to determine Same....Same field_1

14

15

16

| Doc No. | Chq Date | Chq No. | Bill Nos | Name | Amount | Dbl Pymnt Flag |
|---------|-------------|---------|----------|---------------------------|---------|----------------|
| 15 | 3-Dec-2009 | 103417 | 6914 | Ambica Enterprises | 143,360 | |
| 17 | 10-Dec-2009 | 103420 | 40 | Amcol Engineering Stores | 330,752 | |
| 1 | 3-Dec-2009 | 103401 | 371 | Amcol Engineering Stores | 172,800 | |
| 22 | 11-Dec-2009 | 103426 | 45 | Bharat Textile W/aster | 637,440 | |
| 14 | 9-Dec-2009 | 103416 | 39 | H.N.Shah & Co. | 448,000 | |
| 11 | 5-Dec-2009 | 103412 | 22959 | H.S.Enterprise(H.U.F.) | 207,360 | |
| 20 | 10-Dec-2009 | 103423 | 11130 | New Iljas W/ooden Box | 435,200 | |
| 8 | 4-Dec-2009 | 103409 | 9701269 | Pareen Enterprise | 122,112 | |
| 3 | 3-Dec-2009 | 103403 | 110 | R.P.Merchant | 48,640 | |
| 10 | 5-Dec-2009 | 103411 | 5825 | Rajesh Enterprises | 189,696 | |
| 18 | 10-Dec-2009 | 103421 | 5825 | Rajesh Enterprises | 189,696 | |
| 12 | 9-Dec-2009 | 103414 | 96 | Saurin Enterprise | 173,568 | |
| 2 | 3-Dec-2009 | 103402 | 29 | Shakti Auto W/orks | 151,296 | |
| 7 | 4-Dec-2009 | 103408 | 151 | Shree Laxmi Narayan Entp. | 96,000 | |
| 19 | 10-Dec-2009 | 103422 | 29 | Shree Yamuna Entp. | 79,872 | |

=IF(AND(E27=E28, D27=D28) =TRUE, "Dbl Pymnt", "")

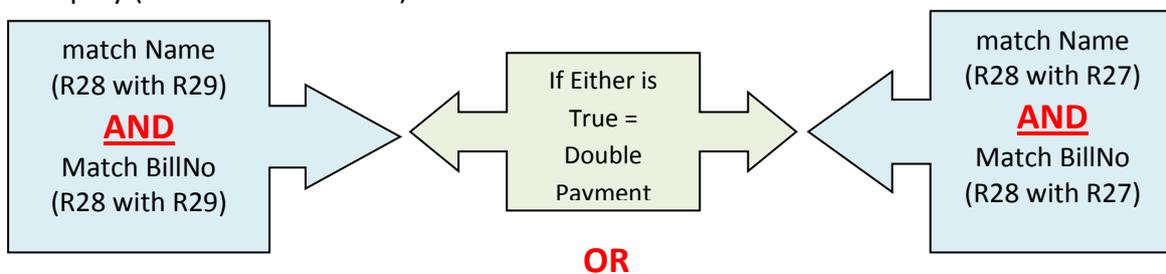
Syntax of 'IF' function used in combination with 'OR'

=IF(OR(Test1,Test2)=Result,If Either True,If Both False)

Example of 'IF' function used in combination with 'AND' + 'OR'

Continuing with the same example as above, it can be seen that we are able to flag only one of the two records of double payments. On applying filters, though we have details of the double payments, we cannot show both the records. It happens because we are comparing the record on current line with a below-line item (in above example Row27 is compared with Row28). Therefore to flag both the records (or if there more than 2 than all the records), we need to compare the current line item with line-item above and line-item below. That is, say for record at Row28, we need to check Row28-with-Row29 AND Row28-with-Row27. If either combination matches then that record needs to be flagged for "Dbl Pymnt".

To simplify (at Record at Row28) we need to :



H28 =IF(OR(AND(E28=E29,D28=D29)=TRUE,AND(E28=E27,D28=D27)=TRUE),"Dbl Pymnt", "")

| Doc | Chq Date | Chq No | Bill Nos | Name | Amount | Dbl Pymt Flag | Dbl Pymt Flag-2 |
|-----|----------|-------------|----------|---------|---------------------------|---------------|-----------------|
| 18 | 15 | 9-Dec-2009 | 103417 | 6914 | Ambica Enterprises | 143,360 | |
| 19 | 17 | 10-Dec-2009 | 103420 | 40 | Amcol Engineering Stores | 330,752 | |
| 20 | 1 | 3-Dec-2009 | 103401 | 371 | Amcol Engineering Stores | 172,800 | |
| 21 | 22 | 11-Dec-2009 | 103426 | 45 | Bharat Textile Master | 637,440 | |
| 22 | 14 | 9-Dec-2009 | 103416 | 39 | H.N.Shah & Co. | 448,000 | |
| 23 | 11 | 5-Dec-2009 | 103412 | 22959 | H.S.Enterprise(H.U.F.) | 207,360 | |
| 24 | 20 | 10-Dec-2009 | 103423 | 11130 | New Ilyas Wooden Box | 435,200 | |
| 25 | 8 | 4-Dec-2009 | 103409 | 9701269 | Parren Enterprise | 122,112 | |
| 26 | 3 | 3-Dec-2009 | 103403 | 110 | R.P Merchant | 48,640 | |
| 27 | 10 | 5-Dec-2009 | 103411 | 5825 | Rajesh Enterprises | 189,696 | Dbl Pymnt |
| 28 | 18 | 10-Dec-2009 | 103421 | 5825 | Rajesh Enterprises | 189,696 | Dbl Pymnt |
| 29 | 12 | 9-Dec-2009 | 103414 | 96 | Saurin Enterprise | 173,568 | |
| 30 | 2 | 3-Dec-2009 | 103402 | 29 | Shakti Auto Works | 151,296 | |
| 31 | 7 | 4-Dec-2009 | 103408 | 151 | Shree Laxmi Narayan Entp. | 96,000 | |
| 32 | 19 | 10-Dec-2009 | 103422 | 29 | Shree Yamuna Entp. | 79,872 | |
| 33 | 5 | 4-Dec-2009 | 103405 | 43 | Sohil Trading Co. | 148,596 | Dbl Pymnt |
| 34 | 21 | 10-Dec-2009 | 103425 | 43 | Sohil Trading Co. | 148,596 | Dbl Pymnt |
| 35 | 9 | 5-Dec-2009 | 103410 | 11753 | Sohil Trading Co. | 610,304 | Dbl Pymnt |
| 36 | 6 | 4-Dec-2009 | 103407 | 5823 | Swastic Hardware Mart | 117,760 | |

=IF(OR(AND(E28=E29,D28=D29)=TRUE,AND(E28=E27,D28=D27)=TRUE),"Dbl Pymnt", "")

On filtering the "Dbl Pymnt" records, we are able to get all the bills that are paid more than once.

The 'COUNTIF' Function

This function counts the number of records satisfying user criteria. This function is extremely useful in analysis of master databases (vendors, customers, employees, etc.) to determine whether there is nexus between them. For example common telephone numbers, fax nos., contact person references, email_ids., etc. can give a clue of linkages. This function can be coupled with 'filter' command to give instant results.

Syntax Of 'COUNTIF' Function:

```
= COUNTIF(criteria_
```

Example Of 'COUNTIF' Function:

The given data is of vendors details –Vendor_name, city, fax-nos. and telephone nos. By using the 'Countif' function we can count (say for Row2) how many times the fax number (in cell C2) is repeated in the entire Col-C (the count is stored in Col-D). Similarly we can also count how many times the tel_no. (in cell E2) is repeated in the entire Col-E (the count is stored in Col-F).

| | A | B | C | D | E | F | G | H | I | J | K | L |
|----|----------------------|----------------|--------------|-----------|--------------|-------|---|---|---|---|---|---|
| | Name | City | Fax Num | Fax-Count | Telephone | Count | | | | | | |
| 1 | KETHAVATH | AP-HYDERABAD | | 0 | 9490191578 | 1 | | | | | | |
| 2 | DEVIDAS | MH-NAGPUR | | 0 | 7122762359 | 1 | | | | | | |
| 3 | MOHMED | GJ-SURAT | | 0 | 9324771766 | 1 | | | | | | |
| 4 | VILAS BASHAL | MH-PUNE | 022-87543245 | 2 | 9819794444 | 2 | | | | | | |
| 5 | GYAN SINGH | MH-PRATAPGARH | | 0 | | 1 | | | | | | |
| 6 | GYAN | MP-INDORE | | 0 | 9425356428 | 1 | | | | | | |
| 7 | NAMINATH JADHAV | MH-PUNE | | 0 | 9323728255 | 2 | | | | | | |
| 8 | SHRI BHAGWATI MOTORS | MH-NAVI MUMBAI | | 0 | 9323728288 | 1 | | | | | | |
| 9 | VISHWAJIT | MH-NAVI MUMBAI | | 0 | 9323728234 | 1 | | | | | | |
| 10 | PRASHANT | WB-CALCUTTA | | 0 | 9831002441 | 2 | | | | | | |
| 11 | NILESH | MH-THANE | | 0 | 9820399934 | 1 | | | | | | |
| 12 | SHIDHAR | MH-AMRAVATI | | 0 | | 1 | | | | | | |
| 13 | K BHANUSHALI | MH-NAVI MUMBAI | | 0 | 98672291333 | 1 | | | | | | |
| 14 | FIROZ | GJ-AHMEDABAD | | 0 | 9426180227 | 2 | | | | | | |
| 15 | JAYESH VORA | MH-NAVI MUMBAI | | 0 | 9324049347 | 1 | | | | | | |
| 16 | MUKESH JAIN | MH-NAVI MUMBAI | | 0 | 36799146 | 1 | | | | | | |
| 17 | NILESH | MH-PUNE | | 0 | 9422348760 | 1 | | | | | | |
| 18 | ANIL | MP-JABALPUR | | 0 | 9300114330 | 1 | | | | | | |
| 19 | MOHSIN | MH-NAVI MUMBAI | | 0 | | 1 | | | | | | |
| 20 | HUNNY MOTORS | DL-NEW DELHI | 011-28548081 | 2 | 011-28548090 | 2 | | | | | | |
| 21 | nakul | MP-JABALPUR | | 0 | 9425383630 | 1 | | | | | | |
| 22 | NASIR KHAN | GJ-AHMEDABAD | | 0 | 9426179977 | 1 | | | | | | |
| 23 | AJIT | MP-KATNI | | 0 | 94251572289 | 1 | | | | | | |
| 24 | MAHENDRA KR JAIN | MH-NAGPUR | | 0 | 2652044 | 1 | | | | | | |
| 25 | BASHIR | MH-NAVI MUMBAI | | 0 | 9322257098 | 1 | | | | | | |
| 26 | SAI | MH-MAHARASHTRA | | 0 | 9323728237 | 1 | | | | | | |
| 27 | MANOHAR | MH-NAVI MUMBAI | | 0 | | 1 | | | | | | |
| 28 | BHAGWATI | MH-NAVI MUMBAI | | 0 | 9323728200 | 1 | | | | | | |
| 29 | H PATHAN | MH-GUJARAT | | 0 | | 1 | | | | | | |
| 30 | A SHAIKH | MH-AHMEDNAGAR | | 0 | 9825521541 | 1 | | | | | | |
| 31 | | | | | | | | | | | | |

For count of telephone nos.
=COUNTIF(E\$1:E\$1501,E2)

For count of fax nos.
=COUNTIF(C\$1:C\$1501,C2)

Thereafter set filters for :

- fax-counts more than 2 and
- tel-counts more than 2

following result is obtained....

.....the linkages bet' the partys are highlighted.

| | A | B | C | D | E | F |
|------|-------------------------|------------------------|---------------|-----------|--------------|-------|
| 1 | Name | City | Fax Num | Fax-Count | Telephone | Count |
| 5 | VILAS BASHAL | MH-PUNE | 022-87543245 | 2 | 9819794444 | 2 |
| 21 | HUNNY MOTORS | DL-NEW DELHI | 011-28548081 | 2 | 011-28548090 | 2 |
| 164 | VIBA MOTORS | MH-PUNE | 022-87543245 | 2 | 9819794444 | 2 |
| 167 | SHAILESH | GJ-AHMEDABAD | 0271-44558677 | 2 | 9327484160 | 2 |
| 172 | JAYDEEP ENTERPRISES | GJ-AHMEDABAD | 0271-44558677 | 2 | 9327484160 | 2 |
| 212 | PAWANJEET SINGH | DL-NEW DELHI | 011-32648611 | 3 | 9212230990 | 3 |
| 274 | GURUNANAK MOTORS | DL-NEW DELHI | 011-32648611 | 3 | 9212230990 | 3 |
| 730 | PERU MOTORS WORKS | TN-TIRUVARUR | 04366-251696 | 2 | 9443383686 | 2 |
| 731 | SWARANJIT SINGH CHHATWA | DL-NEW DELHI | 011-28548081 | 2 | 011-28548090 | 2 |
| 740 | JASBIR SINGH | DL-NEW DELHI | 011-32648611 | 3 | 9212230990 | 3 |
| 880 | G NAGESHWAR | KA-BANGALORE - 3 (East | 040-6654 6700 | 2 | 9886673199 | 2 |
| 942 | MANJUNATH | KA-BANGALORE - 2 (Wes | 040-6654 6700 | 2 | 9886673199 | 2 |
| 992 | KALIAPERUMAL | TN-TIRUVARUR | 04366-251696 | 2 | 9443383686 | 2 |
| 1502 | | | | | | |

The filtered records can be copied on another sheet and sorted on fax_no. / tel_no to get the proper result :

| | A | B | C | D | E | F | G |
|----|--------------------------|-------------------------|---------------|-----------|--------------|-------|---|
| 1 | Name | City | Fax Number | Fax-Count | Telephone 2 | Count | |
| 2 | HUNNY MOTORS | DL-NEW DELHI | 011-28548081 | 2 | 011-28548090 | 2 | |
| 3 | SWARANJIT SINGH CHHATWAL | DL-NEW DELHI | 011-28548081 | 2 | 011-28548090 | 2 | |
| 4 | PAWANJEET SINGH | DL-NEW DELHI | 011-32648611 | 3 | 9212230990 | 3 | |
| 5 | GURUNANAK MOTORS | DL-NEW DELHI | 011-32648611 | 3 | 9212230990 | 3 | |
| 6 | JASBIR SINGH | DL-NEW DELHI | 011-32648611 | 3 | 9212230990 | 3 | |
| 7 | VILAS BASHAL | MH-PUNE | 022-87543245 | 2 | 9819794444 | 2 | |
| 8 | VIBA MOTORS | MH-PUNE | 022-87543245 | 2 | 9819794444 | 2 | |
| 9 | SHAILESH | GJ-AHMEDABAD | 0271-44558677 | 2 | 9327484160 | 2 | |
| 10 | JAYDEEP ENTERPRISES | GJ-AHMEDABAD | 0271-44558677 | 2 | 9327484160 | 2 | |
| 11 | G NAGESHWAR | KA-BANGALORE - 3 (East) | 040-6654 6700 | 2 | 9886673199 | 2 | |
| 12 | MANJUNATH | KA-BANGALORE - 2 (West) | 040-6654 6700 | 2 | 9886673199 | 2 | |
| 13 | PERU MOTORS WORKS | TN-TIRUVARUR | 04366-251696 | 2 | 9443383686 | 2 | |
| 14 | KALIAPERUMAL | TN-TIRUVARUR | 04366-251696 | 2 | 9443383686 | 2 | |
| 15 | | | | | | | |
| 16 | | | | | | | |

The 'SUMIF' Function

This is an extension of widely used 'Sum' function but here the 'SUM' is combined with 'IF'. Thus summation can be obtained of selected records satisfying user defined criteria. This function operates the same way as Pivot Table Command. However, Pivot Table function is not on real-time basis (one need to refresh to get updated results); 'SUMIF' function on other hand works on real-time basis (changes in data instantly updates this formula)

Syntax of the SumIF function is as follows :

```
= SUMIF(criteria_range, criteria,  
sum_range)
```

Example of the SumIF function:

Given data is of quantities of fruits sale with summary of total auntities (kgs.) sold. To check the summary calculation, the SUMIF function can be easily used. Say for fruit-Dates, we take sum of Col-D only for the records where 'Dates' appear in Col-C. Therefore criteria_range will be the Fruit-name (C19:C40), Criteria = C45 ("Dates") and sum_range is quantities in Col D (D19:D40). It needs to be noted that the criteria_range (19:40) matches with sum_range (19:40). The calculated numbers can be compared with the given quantities to show the differences.

The screenshot shows an Excel spreadsheet with a SUMIF formula in cell E45: `=SUMIF(C19:C40,C45,D19:D40)`. The spreadsheet contains data for fruit sales from Dec 3 to Dec 11, 2009. A summary table at the bottom compares 'Calculated' values (from the SUMIF formula) with 'Difference' values. A callout box points to the formula with labels: 'criteria_range' for C19:C40, 'criteria' for C45, and 'sum_range' for D19:D40.

| Date | Fruit | Kgs | Calculated | Difference |
|-----------------|---------|---------------|------------|------------|
| 3-Dec-2009 | Apples | 1,440 | | |
| 3-Dec-2009 | Mangoes | 1,261 | | |
| 3-Dec-2009 | Dates | 405 | | |
| 3-Dec-2009 | Mangoes | 2,773 | | |
| 4-Dec-2009 | Apples | 1,238 | | |
| 4-Dec-2009 | Mangoes | 981 | | |
| 4-Dec-2009 | Mangoes | 800 | | |
| 4-Dec-2009 | Apples | 1,018 | | |
| 5-Dec-2009 | Dates | 5,086 | | |
| 5-Dec-2009 | Mangoes | 1,581 | | |
| 5-Dec-2009 | Mangoes | 1,728 | | |
| 9-Dec-2009 | Apples | 1,446 | | |
| 9-Dec-2009 | Dates | 1,435 | | |
| 9-Dec-2009 | Apples | 3,733 | | |
| 9-Dec-2009 | Apples | 1,195 | | |
| 9-Dec-2009 | Dates | 2,093 | | |
| 10-Dec-2009 | Dates | 2,756 | | |
| 10-Dec-2009 | Mangoes | 267 | | |
| 10-Dec-2009 | Apples | 666 | | |
| 10-Dec-2009 | Apples | 3,627 | | |
| 10-Dec-2009 | Mangoes | 2,496 | | |
| 11-Dec-2009 | Apples | 5,312 | | |
| Total | | 43,337 | | |
| Summary | | | | |
| 3-Dec to 11-Dec | Fruits | Kgs | Calculated | Difference |
| | Dates | | 11,775 | (0) |
| | Mangoes | | 11,887 | 7,788 |
| | Apples | | 11,887 | (7,788) |

The differences (actuals v/s. calculated) are stored in Col-F which can be filtered for non-zeros.

The 'VLOOKUP' Function

This function is extremely useful in linking two databases. This can be, however, only done if there is a common unique reference (generally referred to as 'primary key') between the two databases. All databases built-up on RDBMS work on this prime principle and hence generally it is easy to generate a primary key.

There can be several applications of 'VLookup' function. A few examples could be :

- To verify the rates billed with standard rate-card prices,
- To confirm proper application of interest rates charged for bank advances.
- To vouchsafe whether all dispatches are billed or vice-versa. Similarly vendor- bills can be checked with the Inventory receipts.
- Quantities, rates, etc. in purchase orders can be compared with the vendor_bills. Or even the rates charged can be analysed by comparing multi-vendors or same vendor over different period.
- Multi-years Inventories records can be compared.
- Employee payroll can be compared over the period or with master records.
- Tax rates for employees (withholding tax) , invoices, etc. can be checked.
- Production records can be checked to inventories and vice-versa.

The list can be endless and an effective use can be made depending upon the circumstances and subject matter of the audit / investigation.

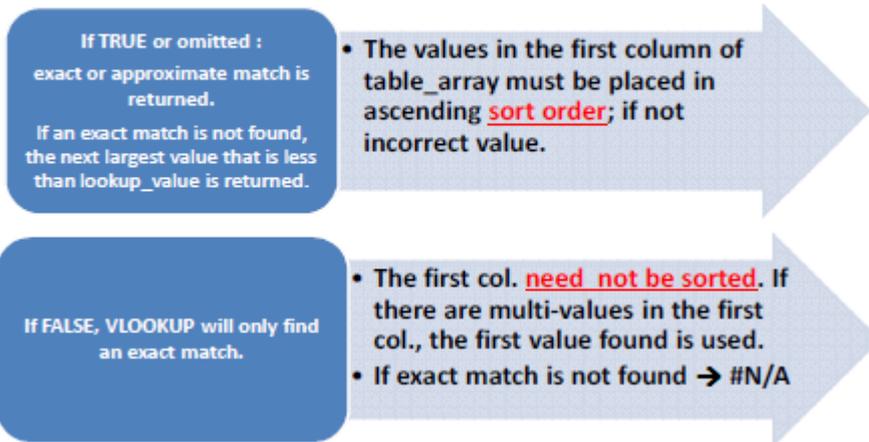
Syntax Of VLOOKUP function :

**=VLOOKUP (lookup_value ,
table array . Col Index.**

Explanation of the formula :

- **Lookup_value** : Criteria value to search in the first column of the table array
- **Table_array** : The Database - the values in the first column of table_array are the values searched by lookup_value. These values can be text, numbers, or logical values. Uppercase and lowercase text are equivalent.
- **Col_index_num** : The column number in table_array from which the matching value must be returned. Generally 2, 3,4,5
- **Range_lookup** : A logical value true or false → to find an exact match or an approximate match.

Range_lookup: A logical value true or false → exact match or an approx match.



Example of VLOOKUP

Given two databases (i) data of sales (marked with green frame) and (ii) data of standard rate card prices (marked with yellow frame). In practice usually the databases are in different worksheets or workbooks, but here it is shown in same worksheet for easy understanding. However the principle is same. The objective is to check whether the correct rates are invoiced to the customer. Using VLOOKUP function, the rates (in Col.D) of rate card (B23:D36) is extracted in Col-Q. The formula is explained in figure below. The difference between rates invoiced (Col.M) and rates chargeable (Col-Q extracted as aforesaid) can be compared.

Rate Card

| Prd-Id | Product | Rate/ Kg |
|--------|------------------|----------|
| 10001 | Cold Roll - 3mm | 206.25 |
| 10002 | Cold Roll - 5mm | 228.88 |
| 10003 | Cold Roll - 8mm | 253.64 |
| 10004 | Cold Roll - 10mm | 285.00 |
| 10005 | Cold Roll - 15mm | 642.10 |
| 10006 | Cold Roll - 18mm | 767.46 |
| 10007 | Cold Roll -20mm | 811.00 |
| 20001 | MS Sheet - 3mm | 2,677.91 |
| 20002 | MS Sheet - 5mm | 3,017.90 |
| 20003 | MS Sheet - 8mm | 3,457.51 |
| 20004 | MS Sheet - 10mm | 3,670.80 |
| 20005 | MS Sheet - 15mm | 5,743.25 |
| 20006 | MS Sheet - 20mm | 7,641.42 |

Sale Bill Data

| Bill Name | Prd-Id | Product | Qty_Kg | Rate_Rs | Bill_Val_Rs. |
|-----------|--------|------------------|--------|----------|--------------|
| 1 D | 10003 | Cold Roll - 8mm | 3500 | 253.64 | 887,740 |
| 2 R | 10007 | Cold Roll -20mm | 1161 | 811.00 | 941,571 |
| 3 H | 10004 | Cold Roll - 10mm | 2500 | 285.00 | 712,500 |
| 4 K | 20003 | MS Sheet - 8mm | 600 | 3,017.90 | 2,074,506 |
| 5 W | 10006 | Cold Roll - 18mm | 5050 | 767.46 | 3,875,673 |
| 6 G | 20006 | MS Sheet - 20mm | 885 | 7,641.42 | 6,762,657 |
| 7 H | 20004 | MS Sheet - 10mm | 2700 | 3,670.80 | 9,911,160 |
| 8 K | 10002 | Cold Roll - 5mm | 420 | 206.25 | 86,625 |
| 9 L | 20004 | MS Sheet - 10mm | 1583 | 3,670.80 | 5,810,876 |
| 10 D | 20006 | MS Sheet - 20mm | 10197 | 7,641.42 | 77,919,560 |
| 11 H | 20004 | MS Sheet - 10mm | 4862 | 3,670.80 | 17,847,430 |
| 12 L | 10003 | Cold Roll - 8mm | 2000 | 253.64 | 507,280 |
| 13 E | 20002 | MS Sheet - 5mm | 2046 | 3,017.90 | 6,174,623 |
| 14 H | 10003 | Cold Roll - 8mm | 1400 | 253.64 | 355,096 |
| 15 K | 10007 | Cold Roll -20mm | 320 | 811.00 | 259,520 |
| 16 E | 10003 | Cold Roll - 8mm | 3500 | 233.84 | 887,740 |
| 17 L | 10007 | Cold Roll -20mm | 1161 | 811.00 | 941,571 |
| 18 G | 10006 | Cold Roll - 18mm | 5050 | 767.46 | 3,875,673 |
| 19 H | 20006 | MS Sheet - 20mm | 885 | 7,641.42 | 6,762,657 |
| 20 W | 20004 | MS Sheet - 10mm | 2700 | 3,270.80 | 9,911,160 |
| 21 D | 10002 | Cold Roll - 5mm | 420 | 232.00 | 86,625 |

Formula: =VLOOKUP(J24,\$B\$23:\$D\$36,3,0)

Callout: =VLOOKUP(J24, B23:D36, 3, 0) where J24 is lookup value, B23:D36 is table, 3 is col index, 0 is range_lookup.

| Correct Rates | Difference |
|---------------|------------|
| 253.64 | - |
| 811.00 | - |
| 285.00 | - |
| 3,457.51 | (439.61) |
| 767.46 | - |
| 7,641.42 | - |
| 3,670.80 | - |
| 228.88 | (22.63) |
| 3,670.80 | - |
| 7,641.42 | - |
| 3,670.80 | - |
| 253.64 | - |
| 3,017.90 | - |
| 253.64 | - |
| 811.00 | - |
| 253.64 | (19.80) |
| 811.00 | - |
| 767.46 | - |
| 7,641.42 | - |
| 3,670.80 | (400.00) |
| 228.88 | 3.12 |

The Col-R can be filtered for non-zero to list the differences which is list where the rates are charged higher or lower for further investigation.

The Pivot Table Function

This function quickly summarizes large data by :

- Querying the data in many user-friendly ways.
- Subtotaling and aggregating numeric data, summarizing data by categories and subcategories, and creating custom calculations and formulae. Besides summing (sum), it can also find average, max, min, etc.
- Expanding and collapsing levels to focus on results, drill-downs to details from the summary.
- Moving rows to columns or vice-versa; see different summaries using various scenarios.
- Filtering, sorting, grouping, etc.

Application of Pivot Table function:

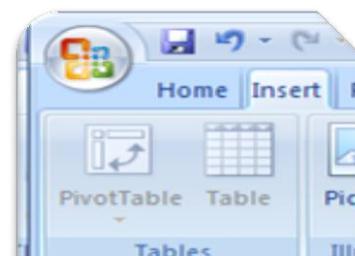
There can be several uses of the Pivot table function, a few examples can be as follows :

- Stratification / Classification of Data – periodwise, party-wise, assets-wise, etc.
- Creating various scenarios with if-then categories, using with filters it is possible to expand and collapse levels. For example in data of vendor bills, a pivot can be created to see Vendor_wise+Item_wise summary or Item_wise+Vendor_wise summary.
- Create Trial Balance of General Ledger, Accounts Payable, Accounts Receivable, Bank Account balances, etc.
- Inventory Summary, Slow Moving / Non-moving Stock, etc.
- Digital Analysis e.g. Benfords Law, Relative Size Factor (RSF), etc.

How to apply the Pivot Table:

Unlike many formulae, the Pivot function does not begin with a '=' sign. This is more of a command and hence not a formula. Therefore this command needs to refresh from time to time to obtain correct results. If there is need for an update on real-time basis, one can use SUMIF, COUNTIF, etc.

To apply the Pivot command, in the insert tab select the PivotTable icon and one needs to navigate through the interactive dialogue box. Select the appropriate data range and where you need to place the output table (the appropriate choice generally should be 'in new sheet' since that will not conflict with your data). Select the appropriate fields for the vertical and horizontal crosstabs as Row_labels and Col_labels. The data to be summarised should be placed in the 'value' section. Here by selecting the 'value field settings', one can select the sum, count, average, max, min, product, etc. Cosmetic touch can be given to the table by selecting appropriate formats or charts.



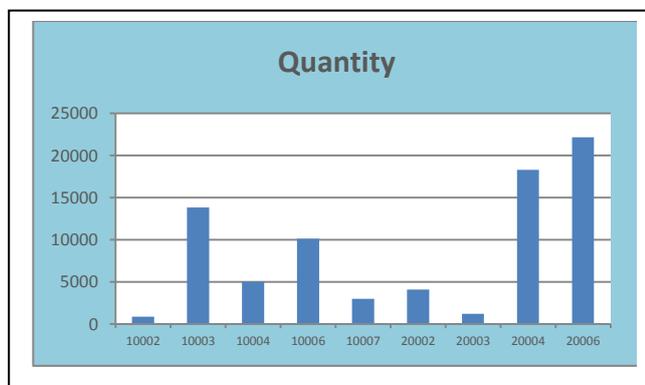
Example of Pivot Table :

Given data is of sales during a period giving details of Bill_No., Customer_name, Product_Id, Quantity billed, etc. The objective is to summarise the quantity product_code wise. Applying the Pivot Table the pivot table / charts can be obtained as shown below :

| Bill Name | Prd-Id | Product | Qty_Kg | Rate_Rs | Bill_Val_Rs. |
|-----------|--------|------------------|--------|----------|--------------|
| 1 D | 10003 | Cold Roll - 8mm | 3500 | 253.64 | 887.74 |
| 2 R | 10007 | Cold Roll -20mm | 1161 | 811.00 | 941.57 |
| 3 H | 10004 | Cold Roll - 10mm | 2500 | 285.00 | 712.50 |
| 4 K | 20003 | MS Sheet - 8mm | 600 | 3,017.90 | 2,074.50 |
| 5 W | 10006 | Cold Roll - 18mm | 5050 | 767.46 | 3,875.67 |
| 6 G | 20006 | MS Sheet - 20mm | 885 | 7,641.42 | 6,762.65 |
| 7 H | 20004 | MS Sheet - 10mm | 2700 | 3,670.80 | 9,911.16 |
| 8 K | 10002 | Cold Roll - 5mm | 420 | 206.25 | 86.62 |
| 9 L | 20004 | MS Sheet - 10mm | 1583 | 3,670.80 | 5,810.87 |
| 10 D | 20006 | MS Sheet - 20mm | 10197 | 7,641.42 | 77,919.56 |
| 11 H | 20004 | MS Sheet - 10mm | 4862 | 3,670.80 | 17,847.43 |
| 12 L | 10003 | Cold Roll - 8mm | 2000 | 253.64 | 507.28 |
| 13 E | 20002 | MS Sheet - 5mm | 2046 | 3,017.90 | 6,174.62 |
| 14 H | 10003 | Cold Roll - 8mm | 1400 | 253.64 | 355.09 |
| 15 K | 10007 | Cold Roll -20mm | 320 | 811.00 | 259.52 |
| 16 E | 10003 | Cold Roll - 8mm | 3500 | 233.84 | 887.74 |
| 17 L | 10006 | Cold Roll -20mm | 1161 | 811.00 | 941.57 |
| 18 G | 10006 | Cold Roll - 18mm | 5050 | 767.46 | 3,875.67 |
| 19 H | 10006 | Cold Roll - 18mm | 885 | 7,641.42 | 6,762.65 |
| 20 W | 10006 | Cold Roll - 18mm | 2700 | 3,270.80 | 9,911.16 |
| 21 D | 10006 | Cold Roll - 18mm | 420 | 232.00 | 86.62 |

| Row Labels | Sum of Qty_Kg |
|--------------------|---------------|
| 10002 | 840 |
| 10003 | 13800 |
| 10004 | 5000 |
| 10006 | 10100 |
| 10007 | 2962 |
| 20002 | 4092 |
| 20003 | 1200 |
| 20004 | 18290 |
| 20006 | 22164 |
| Grand Total | 78448 |

The data can be tabulated on a chart to get an overview and the spikes can be analysed for detailed verification. This is simple use for understanding the principle however complex queries and charts can be generated for different scenarios to give much more insights into the data.



Formula Auditing

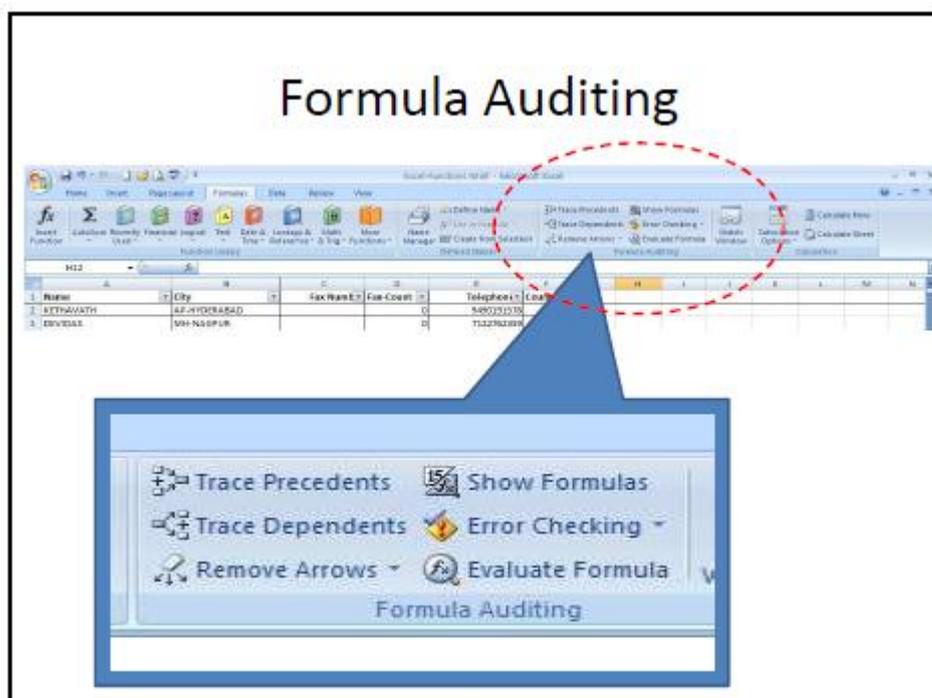
Very often some excel sheets are very complicatedly built-up -- there are many variables spread across multiple sheets and complex formulae make it difficult to audit. Most often such sheets are verified based on rebuild-and-compare method. This can sometime take enormous effort and hence may not be viable. This is where the Formula Auditing options come handy.

This is an in-built tool in MS Excel to quickly spot errors / omissions by locating inconsistencies in data having regard to surrounding region. A check run is conducted for:

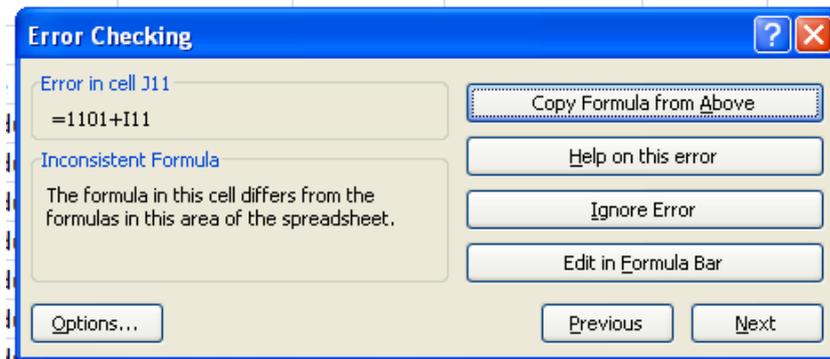
- Cell containing formula that result in error
- Inconsistent calculated column in tables
- Cell containing years represented as two digits
- Numbers formatted as text
- Formulae inconsistent with other formulae in the region
- Formulae which omitted cells in a region
- Unlock cells containing formulae
- Formulae referring to empty cells
- Data entered in a table is invalid

How to use the Formula Auditing Options :

Click on the 'Formula' tab and then select the 'Formual Audting' section as shown in figure below. There are different audit tools available, a combination of which can throw up exceptions. Since this does not change the data, there no fear for data modification.



- Error checking commands works like a spell-check command. It basically checks all the possible errors and shows the errors in a dialogue box (as shown below) giving the cell numbers with possible error and explanation. The user can then correct the errors as he deems fit.



- Also one can use the green-corner sign (see adjacent screen shot) to spot errors. This is similar to the error checking. In error checking explanation is given, while in green-corner is just flagged (this is like the red line shown from wrong spelling in word file). This can be done by enabling the configuration settings in the as shown below.

