



Information Technology Module

2020/2021

Excel

Tables - Search Functions

1. VLOOKUP

Vertical search of a value in a table

VLOOKUP (lookup value; table array; row index num; approximate)

Looks for a value in the first column of a range and returns the corresponding value of another column specified.

Approximate can have the values **TRUE** or **FALSE**.

For example:

= **VLOOKUP** (3375; A2: C21; 3) returns "**Manager**", ie, the function searched in the first column of the range A2: C21 by the value 3375 and returned the contents of the cell that was in column 3 of that line.

	A	B	C
1	empNo	monthSalary	Cathegory
2	3063	2 565,00 €	Werhouse Worker
3	3174	1 768,00 €	Factory Worker
4	3200	2 857,00 €	Werhouse Worker
5	3232	6 326,00 €	Manager
6	3361	1 521,00 €	Factory Worker
7	3375	5 978,00 €	Manager
8	3415	3 555,00 €	FieldEngineer
9	3560	2 930,00 €	Werhouse Worker
10	3630	1 724,00 €	Factory Worker
11	3861	7 821,00 €	Manager
12	3954	4 340,00 €	FieldEngineer
13	3976	4 226,00 €	FieldEngineer
14	3982	2 670,00 €	Werhouse Worker
15	4395	2 925,00 €	Werhouse Worker
16	4824	2 015,00 €	Factory Worker
17	4859	2 831,00 €	Werhouse Worker
18	4895	5 707,00 €	Manager
19	4923	1 629,00 €	Factory Worker
20	4931	1 815,00 €	Factory Worker
21	4973	5 987,00 €	Manager

VLOOKUP

= VLOOKUP (3375; A2: C21; 2)
returns "**5978**", i.e., the function searched the first column in the range A2: C21 with the value 3375 and returned the contents of the cell that was in column 2 of this line.

= VLOOKUP (3380; A2: C21; 2) returns "**5978**", but the 3380 employee is not there, so the function will return the largest value that is less than 3380. In this case the employee is 3375, so it returns what is in column 2 of that line, i.e. 5978.

	A	B	C
1	empNo	monthSalary	Category
2	3063	2 565,00 €	Werhouse Worker
3	3174	1 768,00 €	Factory Worker
4	3200	2 857,00 €	Werhouse Worker
5	3232	6 326,00 €	Manager
6	3361	1 521,00 €	Factory Worker
7	3375	5 978,00 €	Manager
8	3415	3 555,00 €	FieldEngineer
9	3560	2 930,00 €	Werhouse Worker
10	3630	1 724,00 €	Factory Worker
11	3861	7 821,00 €	Manager
12	3954	4 340,00 €	FieldEngineer
13	3976	4 226,00 €	FieldEngineer
14	3982	2 670,00 €	Werhouse Worker
15	4395	2 925,00 €	Werhouse Worker
16	4824	2 015,00 €	Factory Worker
17	4859	2 831,00 €	Werhouse Worker
18	4895	5 707,00 €	Manager
19	4923	1 629,00 €	Factory Worker
20	4931	1 815,00 €	Factory Worker
21	4973	5 987,00 €	Manager

VLOOKUP

In most cases however, we do not want that to happen. Although useful in certain situations this approximate search can produce unwanted results and important information failures. The same formula with the parameter "approximate" changed to **FALSE** would be:

= VLOOKUP (3380; A2: C21; 2; FALSE)
returns **#N/A**, meaning that the function did not find the desired value.

	A	B	C
1	empNo	monthSalary	Cathegory
2	3063	2 565,00 €	Werhouse Worker
3	3174	1 768,00 €	Factory Worker
4	3200	2 857,00 €	Werhouse Worker
5	3232	6 326,00 €	Manager
6	3361	1 521,00 €	Factory Worker
7	3375	5 978,00 €	Manager
8	3415	3 555,00 €	FieldEngineer
9	3560	2 930,00 €	Werhouse Worker
10	3630	1 724,00 €	Factory Worker
11	3861	7 821,00 €	Manager
12	3954	4 340,00 €	FieldEngineer
13	3976	4 226,00 €	FieldEngineer
14	3982	2 670,00 €	Werhouse Worker
15	4395	2 925,00 €	Werhouse Worker
16	4824	2 015,00 €	Factory Worker
17	4859	2 831,00 €	Werhouse Worker
18	4895	5 707,00 €	Manager
19	4923	1 629,00 €	Factory Worker
20	4931	1 815,00 €	Factory Worker
21	4973	5 987,00 €	Manager

VLOOKUP

- 1. If "approximate" is TRUE then 1st column (the search array) must be sorted in ascending order. Otherwise VLOOKUP will give wrong results
If "approximate" is FALSE then the 1st column (search array) does not have to be sorted**
- 2. VLOOKUP is not case sensitive**

VLOOKUP (approximate search)

Suppose you want to convert a range of values, for example, grades 0..20 to classifications A..F:

=VLOOKUP(B2;\$E\$2:\$F\$10;2;TRUE)

	A	B	C	D	E	F
1	studentName	0..20 Grade	A..F Class		Conversion Table	
2	Carl Michael	18,8	A-		0	F
3	Bessie Patel	16,4	B-		9,5	C-
4	Robert L. Shilling	12,6	C		11,5	C
5	Karen Campbell	9,3	F		13,5	C+
6	Joseph R. Cruz	19	A-		14,5	B-
7	Felicia P. Dodge	8,4	F		16,5	B
8	Hazel C. Bannister	11,4	C-		17,5	B+
9	James Tune	13,1	C		18,5	A-
10	Fawn Witt	0	F		19,5	A
11	Gary Renfrow	3,7	F			
12	Mason X. Marquis	17,5	B+			
13	Jamie Castaldo	11,5	C			
14	Cynthia Johnson	12,1	C			
15	Minnie Coleman	16,6	B			
16	Charlotte H. Derrick	15,3	B-			
17	Yvonne Rosas	10,2	C-			
18	Ruben Marshall	17,9	B+			
19	Maria Monk	1,3	F			
20	Anthony Libby	12,7	C			
21	Mickey Rusch	1,3	F			
22	Randy Reed	2,9	F			
23	Maurice Steptoe	14,8	B-			
24	Carl H. Hicks	17,9	B+			
25	Howard Elliot	20	A			
26	Camille Chamberlain	17,1	B			

2. HLOOKUP

Horizontal search of a value in a table

HLOOKUP (lookup value; table array; row index num; approximate)

Looks for a particular value in the first line of a range and returns the corresponding value in another specified line. *Approximate* values can be **TRUE** or **FALSE**.

	A	B	C	D	E	F	G	H
1	empNo	3063	3174	3200	3232	3361	3375	3415
2	monthSalary	2 565,00 €	1 768,00 €	2 857,00 €	6 326,00 €	1 521,00 €	5 978,00 €	3 555,00 €
3	Category	Werhouse Worker	Factory Worker	Werhouse Worker	Manager	Factory Worker	Manager	FieldEngineer

For example: **= HLOOKUP (3232; B1: H3; 3)** returns "**Manager**", i.e., the function searched in the first row of the range B1: G3 by the value 3232 and when it is found, returns the cell contents that were in line 3 of this column.



Information Technology Module

Year 2020/2120

Excel

Date and Time Functions

Date and Time Functions

Before exploring the functions that Excel offers to make calculations with date and time it should be understood the way that Excel works with dates.

For Excel there are two systems of dates, the **system 1900** and **system 1904**. The system 1900 is what is activated by default in Excel for **Windows** and the system 1904 is activated by default in Excel for **Macintosh**.

Either one, start counting the days from **January 1st**. This means that the day number one is **January 1st, 1900** in system 1900, and **January 1st, 1904** in system 1904.

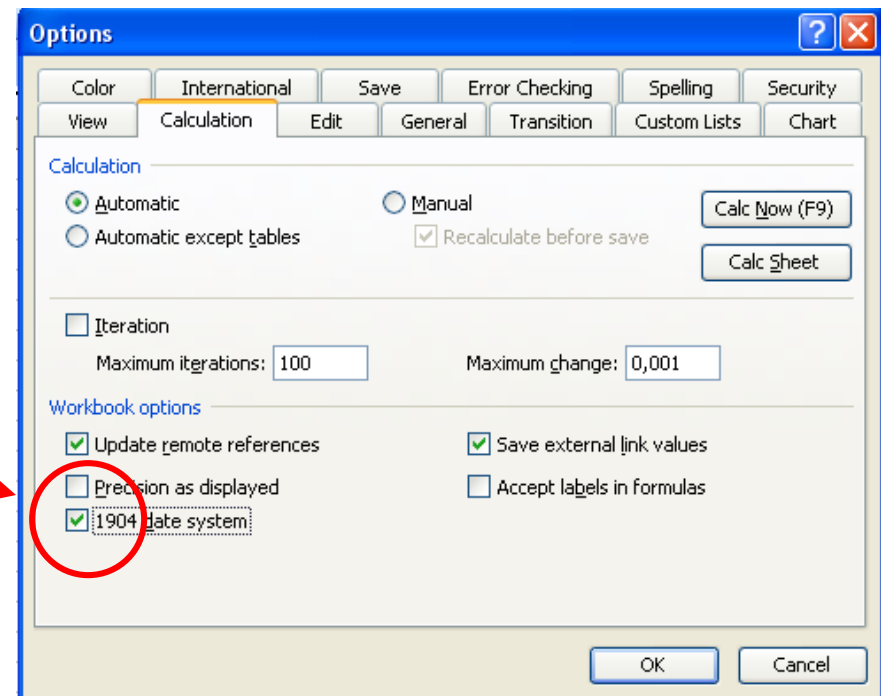
Jorge Sequeira (2005), "EXCEL, Guião de Funções para Economia e Finanças", Escolar Editora, pp. 17 a 47

Functions of Date and Time

Excel offers the possibility to work with either system. For example October 5th, 2011, in the 1904 system would be represented by **39359** and not **40821**.

=DateValue (*value of date*)
=DATEVALUE("5/10/2011")

If you need to change the date system, this can be done in the options panel as indicated.



Functions of Date and Time

Dates are represented by integer values. This means that Excel can calculate, for example, the **difference between two dates**, in an extremely simple way, just by subtracting two integers.

To better understand this mechanism you may open an Excel spreadsheet and insert a date into any cell. Then format the cell in the **General** format. Notice that the date takes the form of an integer value. This value is the number of days from **January 1st, 1900**.

Functions of Date and Time

The **time of day** is represented by a single value, in this case a real number between **0** and **1**. For example 0.5 represents noon (12:00).

The corresponding time of day is calculated by the following formula:

$$value = \frac{\text{hours}}{24} + \frac{\text{minutes}}{1440} + \frac{\text{seconds}}{86400}$$

For example:

$$8h10m = \frac{8}{24} + \frac{10}{1440} = 0,340277778$$

This means that if we represent the day **22nd November 2010 at 14h 35m 22s**, this moment is represented by **40504.60789**

Date and Time Functions

TODAY (system date);

NOW (date and time system);

DATE (integer value of a date);

DAY (between 1 and 31: number of the day from a given date);

WEEKDAY (weekday);

MONTH (between 1 and 12: month number from a given date);

YEAR (year number from a given date)

Today: system date
=TODAY()

The function takes no arguments

When the function is inserted into a cell, Excel returns the system date. But it is not updated automatically.

The cell will be updated when the spreadsheet is recalculated in its entirety, which occurs in two situations:

1. When you press **F9** to force recalculation of entire worksheet;
2. Whenever you change the value of any cell.

If on November 22nd, 2019 the user activates function **TODAY()**:

=TODAY() returns **22-11-2019**

Now (date and time system)
=NOW()

The function takes no arguments

When the function is inserted into a cell Excel returns the system date and time. The date and time of the cell will not be automatically updated.

The cell will be updated when the spreadsheet is recalculated in its entirety, which occurs in two situations:

1. When you press **F9** to force recalculation of entire worksheet;
2. Whenever you change the value of any cell.

If on November 22nd, 2019 by 15 hours 55 minutes and 35 seconds the user activate the function *NOW()*:

=NOW() returns 22-11-2019 15:55:35

Date (integer value of a date)
=DATE(*year;month;day*)

This function returns the integer value corresponding to a certain date. It is useful when you want to handle directly the value of date in the system corresponding date.

Often this function turns out not to be necessary because when you insert a date into a cell that is immediately converted to its integer value, but sometimes it becomes necessary to incorporate the entire value of a date calculation expressions or VBA programs that involves knowing the value of the entire date.

=DATE(1950;5;19) returns 18402
=DATE(2015;12;25) returns 42363

IMPORTANT NOTE

In the following functions:

DAY, WEEKDAY, MONTH and YEAR

the serial number can be represented by integer value date, e.g. 40441, quoted date as "20-09-2015" or by reference to the cell that contains the date

Day (between 1 and 31 days of the entire value of a date)
=DAY(serial number)

This function returns the day (between 1 and 31) corresponding to a certain date.

The date can be specified by its integer value, by the date quoted or the address of the cell that contains the date in the format DD-MM-YYYY

=DAY(18402) returns **19** [remember that =DATE(1950;5;**19**) returns 18402]

	A	B	C
1	21-09-2015	21	=Day(A1)
2			

=DAY("21-09-2015") returns **21**

Weekday (weekday) **=WEEKDAY(serial number; return type)**

This function takes an integer value or date and returns a value between 1 and 7 corresponding to the week in accordance with the following correspondence:

return type = 1 or non specified

1	Sunday
2	Monday
3	Tuesday
4	Wednesday
5	Thursday
6	Friday
7	Saturday

return type = 2

1	Monday
2	Tuesday
3	Wednesday
4	Thursday
5	Friday
6	Saturday
7	Sunday

return type = 3

0	Monday
1	Tuesday
2	Wednesday
3	Thursday
4	Friday
5	Saturday
6	Sunday

=WEEKDAY(42330) returns **1** [means that day 22/11/2015 is Sunday]

	A	B	C
1			Function
2	Date	20-09-2015	
3	Day	20	=Day(B2)
4	Weekday	1	=Weekday(B2)

Month (between 1 and 12 months of an integer value from a date)
=MONTH(*serial number*)

	A	B	C
1			Function
2	Date	20-09-2015	
3	Day	20	=DAY(B2)
4	Weekday	1	=WEEKDAY(B2)
5	Month	9	=MONTH(B2)

Or

-MONTH("20-09-2015")

Or

-MONTH(42267)

Year (year of an integer value of a date)
=YEAR(*serial number*)

	A	B	C
1			Function
2	Date	20-09-2015	
3	Day	20	=DAY(B2)
4	Weekday	1	=WEEKDAY(B2)
5	Month	9	=MONTH(B2)
6	Year	2015	=YEAR(B2)
-			

Or

-YEAR ("20-09-2015")

Or

-YEAR (42267)

Some functions of time

	A	B	C
1			Função
2	Date	20-09-2015 15:30	
3	Hour	15	=HOUR(B2)
4	Minute	30	=MINUTE(B2)
5	Second	0	=SECOND(B2)

= TIME (hour; minute; second) gives as result the number of time series

Ex: = TIME (15;30; 0) gives as result 0,645833333

2. CALCULATION WITH DATES

Age, Days between Dates,...

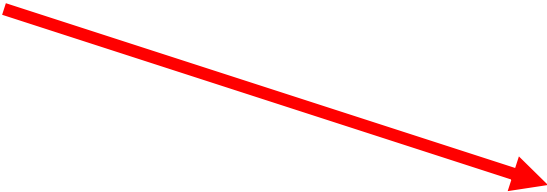
Age

	A	B	C	D	
1	Pessoa	Data de Nascimento	Idade	Função	
2	Frederico	29-11-1972	37	=INT((TODAY()-B2)/365)	
3	Francisco	14-05-1984	26		
4	Fernando	18-02-1948	62		
5					
6					

To Sum days to dates

Assume that today is the 22nd of November 2010.

Do not forget to format the cell with **Number of Days** as **General**.



9			
10	Dia de Hoje	Número de Dias	Data Prevista
11	=TODAY()	120	=A11+B11
12			

9			
10	Dia de Hoje	Número de Dias	Data Prevista
11	22-11-2010	120	22-03-2011
12			