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⇒ Syntax =IF(logical_test, [value_if_true], [value_if_false]) ⇒ Function Objective Determines if a condition is TRUE or FALSE, then returns the corresponding value. ⇒ Argument Argument Required/Optional Explanation logical_test Required Given condition for a cell or a range of cells. [value_if_true] Optional Defined statement if the condition is met. [value_if_false] Optional Defined statement if the condition is not met. ⇒ Return Parameter If statements are not defined, logical values are TRUE or FALSE. If statements are defined, they will appear as return values depending on the condition. Example 1 – Applying the Excel IF Function with Range of Cells We'll check whether there is any book by the author Emily Bronte. STEPS: Select a cell and enter this formula into that cell. =IF(COUNTIF(C5:C21,"Emily Bronte")>0,"There is", "There is Not") Press Enter to see the result. If you want an approximate match, you can use Wildcard Characters (*,?,~) within the COUNTIF function. To find out whether there is any book by the Bronte sisters (Both Emily Bronte and Charlotte Bronte), use the following formula: =IF(COUNTIF(C4:C20,"*Bronte")>0,"There is", "There is Not") Hit the Enter key to show the outcome. How Does the Formula Work? COUNTIF(C5:C21,"Emily Bronte") returns the number of times the name "Emily Bronte" appears in the range C5:C21. COUNTIF(C5:C21,"Emily Bronte")>0 returns TRUE if the name appears at least once in the range, and returns FALSE if the name doesn't appear. IF(COUNTIF(C5:C21,"Emily Bronte")>0,"There is", "There is Not") returns "There is" if the name appears at least once, and returns "There is Not" if the name does not appear. Example 2 – IF Function with a Range of Numeric Values in Excel We will create a list of values from a range that falls between two given numbers. Let's check if their prices fall between $10 and $20. Steps: Select the cell where you want to see the result. Enter the formula there. =IF(((D5>=10)*(D5=10,E5>=20),"Can Purchase","Can not Purchase") Alternatively, use the following formula: =IF((D5>=10)*(E5>=20),"Can Purchase","Can not Purchase") Drag the Fill Handle symbol down or double-click it to AutoFill the range. Example 4 – Using the IF Function with OR Conditions for a Range of Values Steps: Select the first cell where we want to see the result. Insert the formula. =IF(OR(D5>=10,E5>=60),"Can Purchase","Can not Purchase") Alternatively, use the following formula: =IF((D5>=10)+(E5>=60),"Can Purchase","Can not Purchase") Hit Enter to see the result. Drag the Fill Handle icon to copy the formula over the range or double-click the Fill Handle. Example 5 – Using a Nested IF Function for a Range of Values in Excel We'll check whether the price is higher than $30, then check if the number of books is higher than 15. After that, we'll check if the author's name starts with the letter C. If all of these apply, we'll return "Satisfy". Otherwise, we'll return "Does not Satisfy". Steps: Select the first result cell and insert the following formula: =IF(E5>=20,IF(D5>=15,IF(LEFT(C5,1)="C","Satisfy","Does not Satisfy"),"Does not Satisfy"),"Does not Satisfy") Hit the Enter key to see the outcome. Drag the Fill Handle icon down to duplicate the formula over the range. Read More: How to Use IF Function with Multiple Conditions in Excel Example 6 – Combining IF and SUM Functions in Excel for a Range of Values Steps Select G6 and put the following formula into it: =IF(SUM(D5:D21)>=80, "Good", IF(SUM(D5:D21)>=50, "Satisfactory", "Poor")) Press the Enter key to see the outcome. How Does the Formula Work? SUM(D5:D21) this part adds the values of the range and returns the total number of books as a result. SUM(D5:D21)>=80 and SUM(D5:D21)>=50 checks whether the condition is met. IF(SUM(D5:D21)>=80, "Good", IF(SUM(D5:D21)>=50, "Satisfactory", "Poor")) reports the result. In our case, the result was "Good". Example 7 – Joining IF and AVERAGE Functions for a Range of Values Steps: Use the following formula in G6: =IF(AVERAGE(D5:D21)>=20, "Good", IF(AVERAGE(D5:D21)>=10, "Satisfactory", "Poor")) How Does the Formula Work? AVERAGE(D5:D21) calculates the average number of books. AVERAGE(D5:D21)>=20 and AVERAGE(D5:D21)>=10 verify whether the condition was satisfied. IF(AVERAGE(D5:D21)>=20, "Good", IF(AVERAGE(D5:D21)>=10, "Satisfactory", "Poor")) reveals the outcome. The outcome in our situation is "Satisfactory". Example 8 – Using IF and EXACT Functions to Match a Range of Values in Excel Steps: Insert the following formula in the result cell. =IF(EXACT($C$5:$C$21,"Leo Tolstoy"), "Yes", "No") Hit Enter (use Ctrl + Shift + Enter for Excel versions other than Excel 365). How Does the Formula Work? EXACT($C$5:$C$21,"Leo Tolstoy") shows whether both data are an exact match or not. IF(EXACT($C$5:$C$21,"Leo Tolstoy"), "Yes", "No") check the logic and return the result. Example 9 – Combining IF, AND, and TODAY Functions to Get a Date in Excel We want to check whether the arrival date is within 7 days. Steps: Use the following formula: =IF(AND(E5>TODAY(), E5 Greater than =A1>100 < Less than =A1= Greater than or equal to =A1>=75 =80,"Pass","Fail") Translation: if the value in B3 is greater than or equal to 80, return "Pass". Otherwise, return "Fail". See also: 23 tips for formulas (video | article) Criteria Examples This section shows examples of how to build criteria to accomplish a variety of tasks for different kinds of content. Blank or not blank There are several ways you can check for blank or non-blank cells. To return TRUE if A1 is blank, you can use either: =ISBLANK(A1) =A1="" To reverse the logic and check for non-blank cells, you can use: =NOT(ISBLANK(A1)) =A1"" Another way to test for a blank cell is to count characters: =LEN(A1)=0 If the count is zero, the cell is "blank". 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For example, to check if a date is "in the future" you can use the TODAY function like this: =A1>TODAY() To check if a date occurs in the next 30 days, the formula can be extended to: =AND(A1>TODAY(),A115 // greater than 15th =MONTH(A1)=6 // month is June =YEAR(A1) = 2019 // year is 2019 =WEEKDAY(A1)=2 // date is a Monday The safest way to insert a valid date into criteria is to use the DATE function, which accepts year, month, and day as separate arguments. Here are a couple of examples: =A1>DATE(2019,1,1) // after Jan. 1, 2019 =AND(A1>=DATE(2018,6,1),B4.5 This works because 1 day = 24 hours, so a half day = 12 hours. For more granular work, Excel has special functions to extract time by component. For example, with the time 8:45 AM in cell A1: =HOUR(A1) // returns 8 =MINUTE(A1) // returns 45 =SECOND(A1) // returns 0 The safest way to insert a time in criteria is to use the TIME function. Here are some examples: =A1>TIME(9,15,0) // after 9:15 AM =AND(A1>=TIME(9,0,0),A1=$E$3,"Pass","Fail") Placing the passing score in cell E3 makes it easy to change at any time without editing formulas. Note that the reference to $E$3 is absolute to prevent changes as the formula is copied down. Making criteria variable in COUNTIFS, SUMIFS, etc. As before, if criteria are testing for equality, no special handling is needed: =COUNTIF(range,A1) // count cells equal to A1 However, if criteria include operators, you will need to use concatenation. For example, to count cells greater than A1, join ">" to "A1" like this: =COUNTIF(range,">"&A1) The concatenation runs first. If A1 contains the number 10, this is the formula after concatenation: =COUNTIF(range,">10") Notice the pattern is the same as explained earlier – if criteria includes operators, it must appear in quotes (""). Here are more examples of using concatenation in criteria: =COUNTIF(range,""&TODAY()) // count dates in future =COUNTIF(range,"10") // count cells greater than 10 =COUNTIFS(A1:A100,"" to "A1" like this: =COUNTIF(range,">"&A1) The concatenation runs first. If A1 contains the number 10, this is the formula after concatenation: =COUNTIF(range,">10") Notice the pattern is the same as explained earlier – if criteria includes operators, it must appear in quotes (""). Here are more examples of using concatenation in criteria: =COUNTIF(range,""&TODAY()) // count dates in future =COUNTIF(range,"="&AGGREGATE(16,6,$C$8:$C$200/($A$8:$A$200=A3)/($B$8:$B$200=B3),0.5)*0.2) Copy down One of the most important skills for building formulas is creating criteria – the part of a formula that decides what to include or exclude in a calculation. However, it can be surprisingly tricky to build effective criteria because it requires a good understanding of how Excel handles data. If you've ever spent an afternoon troubleshooting a formula that seems like it should "just work", you know what I mean :) This guide aims to help you build formulas that work the first time. Note: language mavens will point out that "criterion" is singular and "criteria" is plural, but I'm going to use "criteria" in both cases to keep things simple. Function names on dark backgrounds below are links to more information. What do criteria do? Among other things, criteria: Direct logical flow with IF/THEN logic Restrict processing to matching values only Create conditional sums and counts Filter data to exclude irrelevant information Trigger conditional formatting rules To help set the stage, let's look at three examples of criteria in action. Example #1 In the screen below, F3 contains this formula: =IF(E3>30,"Yes","No") Translation: If the value in E3 is greater than 30, return "Yes", otherwise return "No". Here, E3>30 is the criteria, used inside IF to determine if the formula should return "Yes" or "No" for each invoice. Example #2 In the next example, D3 contains this formula: =IF(OR(B3="red",B3="green"),C3*1.1,C3) Translation: if B3 is either "red" or "green", increase the price by 10%. Otherwise, return the original price. Example #3 In this example, the SUMIFS function is used to sum the total only when the color is "red": =SUMIFS(E3:E7,B3:B7,"red") Translation: sum values in E3:E7 when the value in B3:B7 is "red". Criteria Basics This section covers the building blocks of formula criteria and some simple ways to verify that criteria are performing as expected. What are criteria? Criteria are logical expressions that return TRUE or FALSE, or their numerical equivalents, 1 or 0. That's it. The trick is to construct criteria in a way so that they only return TRUE when the test meets your exact criteria. In all other cases, criteria should return FALSE or zero. If you can master this one idea, you have the foundation to build and understand many advanced formulas. Logical operators Criteria often make use of the logical operators listed in the table below. Operator Meaning Example = Equal to =A1=10 Not equal to =A110 > Greater than =A1>100 < Less than =A1= Greater than or equal to =A1>=75 =80,"Pass","Fail") Translation: if the value in B3 is greater than or equal to 80, return "Pass". Otherwise, return "Fail". See also: 23 tips for formulas (video | article) Criteria Examples This section shows examples of how to build criteria to accomplish a variety of tasks for different kinds of content. Blank or not blank There are several ways you can check for blank or non-blank cells. 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Criteria for numbers To test if A1 is equal to 5, you can use criteria like this: =A1=5 // TRUE if A1 equals 5 Here are some other examples of criteria to test numeric values: =A1=1 // greater than or equal to 1 =A10 // not equal to zero =AND(A1>0,A13,"Late","") Excel also provides a large number of specific functions for working with dates. For example, to check if a date is "in the future" you can use the TODAY function like this: =A1>TODAY() To check if a date occurs in the next 30 days, the formula can be extended to: =AND(A1>TODAY(),A115 // greater than 15th =MONTH(A1)=6 // month is June =YEAR(A1) = 2019 // year is 2019 =WEEKDAY(A1)=2 // date is a Monday The safest way to insert a valid date into criteria is to use the DATE function, which accepts year, month, and day as separate arguments. Here are a couple of examples: =A1>DATE(2019,1,1) // after Jan. 1, 2019 =AND(A1>=DATE(2018,6,1),B4.5 This works because 1 day = 24 hours, so a half day = 12 hours. 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If A1 contains the number 10, this is the formula after concatenation: =COUNTIF(range,">10") Notice the pattern is the same as explained earlier – if criteria includes operators, it must appear in quotes (""). Here are more examples of using concatenation in criteria: =COUNTIF(range,""&TODAY()) // count dates in future =COUNTIF(range,"10") // count cells greater than 10 =COUNTIFS(A1:A100,"" to "A1" like this: =COUNTIF(range,">"&A1) The concatenation runs first. If A1 contains the number 10, this is the formula after concatenation: =COUNTIF(range,">10") Notice the pattern is the same as explained earlier – if criteria includes operators, it must appear in quotes (""). Here are more examples of using concatenation in criteria: =COUNTIF(range,""&TODAY()) // count dates in future =COUNTIF(range,"=" & $H$2) M2: Formula calculates 5th largest Total for orders in data set, on or after Feb 3rd =LARGE(IF($A$3:$A$29>=$H$2, $D$3:$D$29), MIN($K$2,$I$2)) F1: Criteria Heading -- Leave blank F2: Criteria: =AND(A3>=$H$2,D3>=$M$2) How It Works The LARGE function returns the fifth largest value in the dataset range D3:D29, for dates on or after Feb 3rd. An absolute reference is used for each range, such as $A$3:$A$29. NOTE: This formula is arrayed enterd (Ctrl+Shift+Enter), to create a LARGE IF formula -- it returns the 5th largest total for the records IF the date is greater than Feb 3rd. NOTE: If there are fewer records than the Top # entered, the lower number is used -- MIN($K$2,$I$2) In cell F2, the criteria formula checks two things: Cell A3, the first cell with data in the Date column, is compared to this value. A relative reference is used for this -- A3. Rows with a Total value that is greater than or equal to the fifth largest number, and a date on or after Feb 3rd, pass through the Excel advanced filter. (Note: In the case of ties, more than five records may be returned) The AND function adds a second criiteria to the filter -- the total must be greater than the minimum calculated in cell M2 In the screen shot below, the top five records with dates on or after Feb 3rd are in the filtered results. Filter for Matching Data in Two Columns This Advanced Filter criteria example extracts records where there is a matching value in two columns -- the Ordered date must be equal to the Shipped date. Here's what's in the criteria range, in column F. The heading cell is left blank, because the criterion is a formula: F1: Criteria Heading -- Leave blank F2: Criteria: =C2=D2 In each record, the Order date is compared to the Ship date. A relative reference is used for this -- C2 and D2. The Excel Advanced Filter extracts the rows where the two dates are equal . Filter for Unmatched Data To see the steps for creating an Advanced Filter for unmatched amounts in a row, please watch this short video. The written instructions are shown below. Filter for Unmatched Data in Two Columns This Advanced Filter criteria example extracts records where there are unmatched values in two columns -- the Invoice Amount is not equal to the Paid amount. Here's what's in the criteria range, in column F. The heading cell is left blank, because the criterion is a formula: F1: Criteria Heading -- Leave blank F2: Criteria: =C2D2 In each record, the Invoice amount is compared to the amount Paid. A relative reference is used for this -- C2 and D2. Rows where the amounts are not equal are displayed. Note: You can use a column heading in the criteria formula, instead of a cell reference. The formula will return the #NAME? error or #VALUE! error, but the filter will work correctly. For example: F2: Criteria: =InvoicePaid Find Numbers within a Number This Advanced Filter criteria example extracts records where there is an 8, anywhere within the OrderID number. Here's what's in the criteria range, in column F. The heading cell is left blank, because the criterion is a formula: F1: Criteria Heading -- Leave blank F2: Criteria: =ISNUMBER(FIND("8",C2)) The FIND function looks for the string "8" in the contents of cell C2. If it finds the number, the result is the location of the number in the string. If the number is not found, an Error is the result. Filter Rows with Blank Cells This video shows the steps for creating an Advanced Filter for rows with blank cells, please watch this short video. The written instructions are shown below the video. Option 1 - Filter for Blank Cells This is the option shown in the video, above. Use these criteria range settings to filter rows with blank cells F1: Criteria Heading -- Leave blank F2: Criteria: =C2="" In each record, the value in column C is checked. If it is an empty string, the record passes through the Excel advanced filter. Option 2 - Filter for Blank Cells Use these criteria range settings to filter rows with blank cells F1: Criteria Heading -- Product (this is an exact match for the column heading) F2: Criteria: ="=" In each record, the value in column C is checked. If the cell is empty, the record passes through the Excel advanced filter. Filter to Match Items in a List You can create a list of items on a worksheet, then filter another list, to show only the records that contain those items. There are 2 examples below: Filter rows that have an exact match for items in the list Filter rows that contain an item in the list, anywhere in the cell For more examples, see the Filter with Criteria List page. 1. Exact Match For Items in List The COUNTIF function is used in the Criteria range, to check each record, and test for the list items. Rows with an exact match are returned in the filter. Written instructions are below the video. Two criteria are used in this advanced filter total must be greater than 1000 product must be in the list in column I NOTE: To filter the results to a different sheet, start the filter from the destination sheet. See the details here. To set up the Advanced Filter: In Column I, enter the list of items that you want to match -- Bread and Cookies, in this example. Enter the following values/formulas in the Criteria range: F1: Criteria Heading -- "Total" F2: Criteria: >1000 G1: Criteria Heading -- Leave blank G2: Criteria: =COUNTIF(I:I,C2) In each record, the value in column C is checked. If it is in the list in column I, and the total is greater than 1000, the record passes through the Excel advanced filter. 2. Contain an Item in the List The SUMPRODUCT and COUNTIF functions are used in the Criteria range, to check each record, and test for the list items. Rows that contain an item in the list, anywhere in the Product cell, are returned in the filter. Two criteria are used in this advanced filter total must be greater than 100 product must contain an item in the list in column I, anywhere in the product cell To set up the Advanced Filter: In Column I, enter the list of items that you want to match -- Bread and Cookies, in this example. Format the list as a named Excel Table (tblFind in this example) Name the list of items in the table. In this example, the list is named FindList. Enter the following values/formulas in the Criteria range: F1: Criteria Heading -- "Total" F2: Criteria: >100 G1: Criteria Heading -- Leave blank G2: Criteria: =SUMPRODUCT(COUNTIF(C2,"*"& FindList &"*"))>0 In each record, the value in column C is checked. If it contains an item from the list in column I, and the total is greater than 100, the record passes through the Excel advanced filter. Get Sample Files Criteria Examples: Get the Excel workbook with these Advanced Filter criteria examples. The zipped workbook is in xlsx format, and does not contain any macros. Match Items in List: Get the Excel workbook used in the video, Filter to Match Items in List. The zipped workbook is in xlsx format, and does not contain any macros. Advanced Filter Macros: To see VBA code for working with advanced filters, and to get sample files, go to the Advanced Filter Macros page. Get Monthly Excel Tips! Don't miss my monthly Excel newsletter! You'll get quick tips, article links, and a bit of fun. Add your email, and click Subscribe. Next, when you get my reply, click the Confirm button. I add this step to protect you from spam! More Filter Tutorials Advanced Filter Basics Excel Filter Based on List Filter to Different Sheet Advanced Filter Macros Advanced Filter Criteria Slicers AutoFilter Basics AutoFilter Tips AutoFilter Macros One of the most important skills for building formulas is creating criteria – the part of a formula that decides what to include or exclude in a calculation. However, it can be surprisingly tricky to build effective criteria because it requires a good understanding of how Excel handles data. If you've ever spent an afternoon troubleshooting a formula that seems like it should "just work", you know what I mean :) This guide aims to help you build formulas that work the first time. Note: language mavens will point out that "criterion" is singular and "criteria" is plural, but I'm going to use "criteria" in both cases to keep things simple. Function names on dark backgrounds below are links to more information. What do criteria do? 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