



FIT1013 Digital Futures: IT for Business  
 Week 3: Advanced functions in Excel  
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On completion of your study this week, you should aim to:

- Use the IF, AND and OR functions
- Nest the IF function
- Use the VLOOKUP, HLOOKUP, IFERROR functions
- Use conditional formatting
- Summarise data using the COUNTIF, SUMIF, and AVERAGEIF functions



## Working with Logical Functions

- Logical functions (IF, AND, and OR) determine whether a condition is true or false
- Conditions use a comparison operator (<, <=, =, <>, >, or >=) to compare two values
- Combine two or more functions in one formula to create more complex conditions



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## Working with Logical Functions

- To effectively communicate a table's function, keep the following guidelines in mind when creating fields in an Excel table:
  - Create fields that require the least maintenance
  - Store smallest unit of data possible in a field
  - Apply a text format to fields with numerical text data



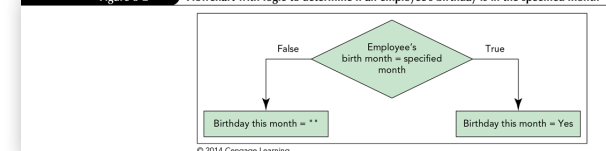
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## Working with Logical Functions

- Using the IF Function
  - A logical function that evaluates a single condition and results in only one value
  - Returns one value if the condition is true and another value if the condition is false
  - Syntax:

**IF(logical\_test, value\_if\_true, value\_if\_false)**

Figure 8-2 Flowchart with logic to determine if an employee's birthday is in the specified month

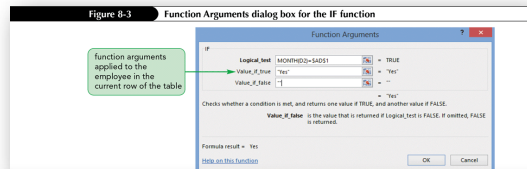


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## Working with Logical Functions



**Figure 8-4** Birthday Month column added to the Employee table

formula for the Birthday Month column

calculated column

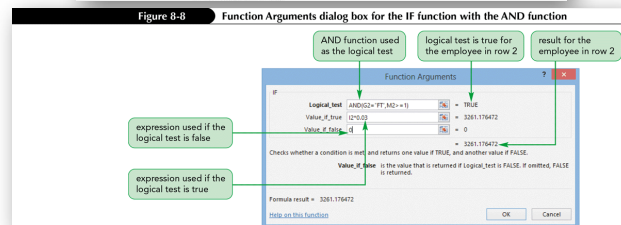
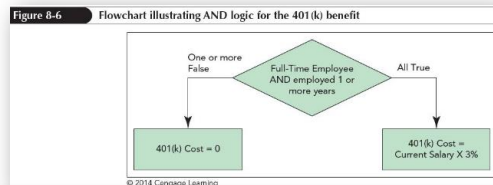
Emp ID	Last Name	Hire Date	Birth Date	Gender	Location	Job Status	Perf Rating	Current Salary	Medical Plan	Dental Plan	Age	Years Service	Birthday Month
1002	Low	6/24/2010	8/6/1966	F	NY	PT	3	\$108,706	SPOUSE2500	EMP+SPOUSE	49	6.6	Yes
1006	Porter	6/28/2014	12/10/1965	F	SP	PT	2	\$ 75,818	NONE	NONE	50	2.3	No
1010	Spaulst	4/24/2015	8/24/1968	M	SP	PT	2	\$ 46,143	FAMILY1000	EMP+FAMILY	47	1.7	Yes
1014	Hunt	7/18/2014	8/9/1969	M	NY	PT	3	\$ 84,111	NONE	NONE	56	2.5	No
1018	Hansen	8/21/2015	7/16/1960	F	NY	PT	1	\$ 44,111	NONE	NONE	55	1.4	No
1022	Philo	3/5/2015	6/2/1968	F	SP	PT	2	\$130,111	NONE	NONE	57	1.8	No
1026	Reid	3/1/2015	12/7/1977	M	SP	PT	3	\$101,111	NONE	NONE	38	3.8	No
1030	Annaeigh	12/8/2015	12/4/1961	F	NY	PT	2	\$ 38,421	SPOUSE1000	EMP+SPOUSE	54	1.1	No
1034	Vannawent	8/1/2015	1/10/1969	F	NY	PT	3	\$ 55,582	FAMILY1000	EMP+FAMILY	56	5.4	No
1038	Mcconke	6/12/2009	1/30/1942	F	AT	PT	2	\$ 24,373	FAMILY2500	EMP+FAMILY	73	7.6	No

## Working with Logical Functions

- Using the AND Function
  - A logical function that tests two or more conditions (up to 255) and determines whether all conditions are true
  - Returns the value TRUE if all logical conditions are true and the value FALSE if any or all logical conditions are false
  - Syntax:

$\text{AND}(\text{logical1}[\text{,logical2}]...)$

## Working with Logical Functions



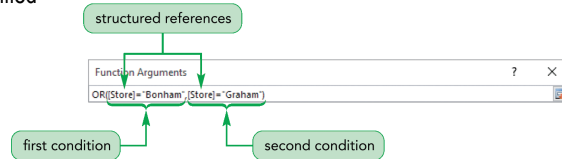
## Working with Logical Functions

- Using the OR Function
  - A logical function that returns a TRUE value if any of the logical conditions (up to 255) are true and a FALSE value if all the logical conditions are false
  - Syntax:

$\text{OR}(\text{logical1}[\text{,logical2}]...)$

### Using Structured References to Create Formulas in Excel Tables

- Replace specific cell or range address with a structured reference, the actual table name, or a column header
- A formula that includes a structured reference can be fully qualified or unqualified



#### Examples:

Unqualified structured reference – [Current Salary], [Store], [Job Status] etc.

Qualified structured reference – EmployeeTbl[Current Salary], EmployeeTbl[Store], etc.

### Structured References

- <https://www.youtube.com/watch?v=NBLtGWVyXmo>
- 8.3 mins
- <https://support.office.com/en-us/article/Using-structured-references-with-Excel-tables-f5ed2452-2337-4f71-bed3-c8ae6d2b276e>
- Useful explanation and examples on how to use Structured References

### Creating Nested IFs

- To allow for three or more outcomes
- One IF function is placed inside another IF function to test an additional condition
- More than one IF function can be nested

### Creating Nested IFs

**Purpose:** To determine the outcome of football games for the home team

**Logic Scenario:** Display Won, Lost, or Tie based on home team and visitor team scores

**Formula:** Nested IF functions  
`=IF(B1>B2,"Won",IF(B2>B1,"Lost","Tie"))`

**Data:** cell B1 stores the home team score  
 cell B2 stores the visitor team score

**Example:**

Data		Condition1	Condition2	Results
Cell B1	Cell B2	B1>B2	B2>B1	(Outcome)
21	18	True	Not evaluated	Won
17	24	False	True	Lost
9	9	False	False	Tie

## Creating Nested IFs

Figure 8-17 Additional example of nested IF functions

**Purpose:** To determine the fee for a driver's license

**Logic Scenario:** Driver's license fee varies by age  
 Below 16 "Too Young"  
 16-45 \$30  
 46-60 \$25  
 61 and older \$20

**Formula:** Nested IF functions  
`=IF(B1<16,"Too Young",IF(B1<=45,30,IF(B1>=60,20,25)))`

**Data:** cell B1 stores the driver's age

**Example:**

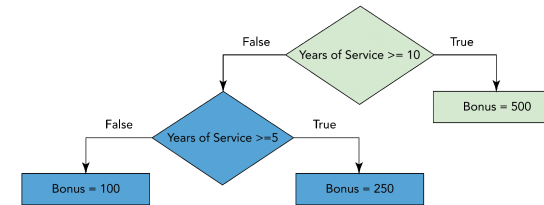
Data	Condition1	Condition2	Condition3	Results
Cell B1	B1<16	B1<=45	B1<=60	(fee)
15	True	Not evaluated	Not evaluated	Too Young
25	False	True	Not evaluated	30
55	False	False	True	25
65	False	False	False	20

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## Creating Nested IFs

- The following formula and flowchart convey the same nested IF function

`=IF([Years of Service]>=10,500, IF([Years of Service]>=5, 250, 100))`



## Using LOOKUP Functions

- Lookup functions allow you to use tables of data to find values in a table and insert them in another worksheet location
- Both the VLOOKUP and HLOOKUP functions are used to return a value from a lookup table
  - The VLOOKUP function always searches for a value in the first column of the lookup table
  - The HLOOKUP function always searches for a value in the first row of the lookup table

## Using LOOKUP Functions

- Lookup tables can be constructed as either exact match or approximate match lookups
  - Exact match lookup occurs when the lookup value must match one of the values in the first column (or row) of the lookup table
  - An approximate match lookup occurs when the lookup value is found within a range of numbers in the first column (or row) of the lookup table

## Using LOOKUP Functions

- Using the VLOOKUP Function to Find an Exact Match
  - Searches vertically down the first column of the lookup table
  - Syntax:

**VLOOKUP(lookup\_value,table\_array,col\_index\_num[range\_lookup])**

## Using LOOKUP Functions



## Using LOOKUP Functions

- Using the VLOOKUP Function to Find an Approximate Match
  - Returns a value based on an approximate match lookup in the first column of the table
  - The values in the first column or row of a lookup table can represent a range of values
  - Quantity discounts, shipping charges, and income tax rates are a few examples of approximate match lookups

## Using the LOOKUP Function

- Using the HLOOKUP Function to Find an Exact Match
  - Searches horizontally across top row of table and retrieves the value in the column you specify
  - Use when comparison values are located in the first row of the lookup table and you want to look down a specified number of rows to find the data to enter in another cell
  - Syntax:

**HLOOKUP(lookup\_value,table\_array,row\_index\_num[,range\_lookup])**

## Using the IFERROR Function

- Error values
  - Indicate that an element in a formula or a cell referenced in a formula is preventing Excel from returning a calculated value
  - Begin with a number sign (#) followed by an error name that indicates the type of error

## Using the IFERROR Function

- Displays a more descriptive message that helps users fix the problem
- Can determine if a cell contains an error value and then display the message you choose rather than the default error value
- Use the IFERROR function to find and handle formula errors
- Syntax: `IFERROR(expression,valueIfError)`

## Using the IFERROR Function

VLOOKUP function cannot find All in the Supplier Name or Specialty Store lookup tables

data entry error

resulting error value

Part Number	Product Category	Description	Supplier Name	Specialty
43	4005 Jewelry Making	Gold Earring Wires	Stones and Glass	Bowie
44	4010 Floral Crafting	2-1/2" Scissors	Silk Flowers	Bowie
45	4020 Quilting	2-1/2" Scissors	Fabric Stores	Garland
46	4022 Yarn Crafting	Light Green Yarn 8 oz	Yarn House	Graham
47	4030 All	3-1/2" Scissors	#N/A	#N/A
48	4040 Model Ship Building	Cement	Hobby Warehouse	Bonham
49	4050 Model Train Building	Glue	Hobby Warehouse	Bonham
50	4105 Jewelry Making	Silver Earwire Spacer Bead	Stones and Glass	Bowie
51	4111 Quilting	Ruler - 2 X 2 grid	Fabric Stores	Garland
52	4210 Floral Crafting	Silk Fall Leaves Stem	Silk Flowers	Bowie
53	4280 Floral Crafting	Begonia Stem	Silk Flowers	Bowie
54	4502 Jewelry Making	3-Way Connector Gold	Stones and Glass	Bowie
55	4510 Model Ship Building	USS Constitution	Hobby Warehouse	Bonham
56	4540 Floral Crafting	Orchid Stem	Silk Flowers	Bowie
57	4820 Model Ship Building	CVN-77 GHW Bush	Hobby Warehouse	Bonham
58	4910 Model Train Building	Union Pacific Big Boy	Hobby Warehouse	Bonham
59	5000 Dressmaking	White Silk - Bolt	Fabric Stores	Garland
60	5002 Quilting	Pink glass head - 250	Fabric Stores	Garland
61	5005 Jewelry Making	Lobster Clasp	Stones and Glass	Bowie

Part Number	Product Category	Description	Supplier Name	Specialty St
18	2100 Model Train Building	Standard Gauge Pullman Observation Car	Hobby Warehouse	Bonham
19	2105 Jewelry Making	Seed Beads Blue	Stones and Glass	Bowie
20	2111 Quilting	Flannel - Flower Patch Black - Bolt	Fabric Stores	Garland
21	2120 Yarn Crafting	Light Yellow Yarn - Box	Yarn House	Graham
22	2180 Quilting	White Cotton Quilt Back	Fabric Stores	Garland
23	2191 Quilting	Muslin Quilt Back	Fabric Stores	Garland
24	2200 Model Train Building	Standard Gauge Coal Hopper Car	Hobby Warehouse	Bonham
25	2230 Yarn Crafting	Royal Blue Yarn Box	Yarn House	Graham
26	2300 Model Train Building	O Gauge Caboose - Red	Hobby Warehouse	Bonham
27	2310 Yarn Crafting	Light Blue Yarn Box	Yarn House	Graham
28	2430 Yarn Crafting	Variegated Blue Yarn Box	Yarn House	Graham
29	2502 Jewelry Making	Crimp Beads Silver	Stones and Glass	Bowie
30	2503 Yarn Crafting	Beige Yarn Box	Yarn House	Graham
31	2510 Model Ship Building	Wooden Flying Dutchman	Hobby Warehouse	Bonham
32	3005 Jewelry Making	Beeswax	Stones and Glass	Bowie
33	3022 Yarn Crafting	Set Metal Knitting Needles	Yarn House	Graham
34	3105 Jewelry Making	Fish Hook Wire	Stones and Glass	Bowie
35	3111 Quilting	Flannel - Flower Patch Blue - Bolt	Fabric Stores	Garland
36	3210 Floral Crafting	Silk Poinsetta Stem	Silk Flowers	Bowie
37	3280 Floral Crafting	Anemone Stem	Silk Flowers	Bowie
38	3502 Jewelry Making	Crimp Beads Gold	Stones and Glass	Bowie
39	3510 Model Ship Building	Plates of the Caribbean	Hobby Warehouse	Bonham
40	3540 Floral Crafting	Chrysanthemum Stem	Silk Flowers	Bowie
41	3820 Model Ship Building	CVN-78 Gerald Ford	Hobby Warehouse	Bonham
42	4000 Dressmaking	Tape Measure	Fabric Stores	Garland
43	4005 Jewelry Making	Gold Earring Wires	Stones and Glass	Bowie
44	4010 Floral Crafting	2-1/2" Scissors	Silk Flowers	Bowie
45	4020 Quilting	2-1/2" Scissors	Fabric Stores	Garland
46	4022 Yarn Crafting	Light Green Yarn 8 oz	Yarn House	Graham
47	4030 All	3-1/2" Scissors	Various	Various
48	4040 Model Ship Building	Cement	Hobby Warehouse	Bonham
49	4050 Model Train Building	Glue	Hobby Warehouse	Bonham

## Activity

Convert the following criteria used to determine a student's degree classification to a table that can be used in a VLOOKUP function to display the level of each student:

Marks	Classification
>=0 and <=50	Fail
>=51 and <=60	Ordinary Degree
>=61 and <=70	Second Lower
>=71 and <=90	Second Upper
>=91	First Class

Marks	Classification
0	Fail
51	Ordinary Degree
61	Second Lower
71	Second Upper
91	First Class

## Exercise

Which function could be used with the following Sales Tax Rate table to display the sales tax rate for a customer in one of these four states?

State	VIC	NSW	QLD	WA
Sales Tax Rate	10%	7%	9%	9.5%

## Tutorial Activities

- Use conditional formatting
- Summarise data using the COUNTIF, SUMIF, and AVERAGEIF functions
  - Advanced Filters
  - Functions for summarising and analysing a table
    - The Database Functions
    - SUMIF and SUMIFS
    - COUNTIF and COUNTIFS
    - AVERAGEIF and AVERAGEIFS

## Summary

- Logical functions : IF, AND, OR, Nested IF function
- Reference functions: VLOOKUP, HLOOKUP, IFERROR
- Conditional formatting
- Summarise data using the COUNTIF, SUMIF, and AVERAGEIF functions
- Homework
  - Go through Module 8 of textbook
  - Attempt Quiz 3
- Next week
  - Develop an Excel application (Excel Module 7)