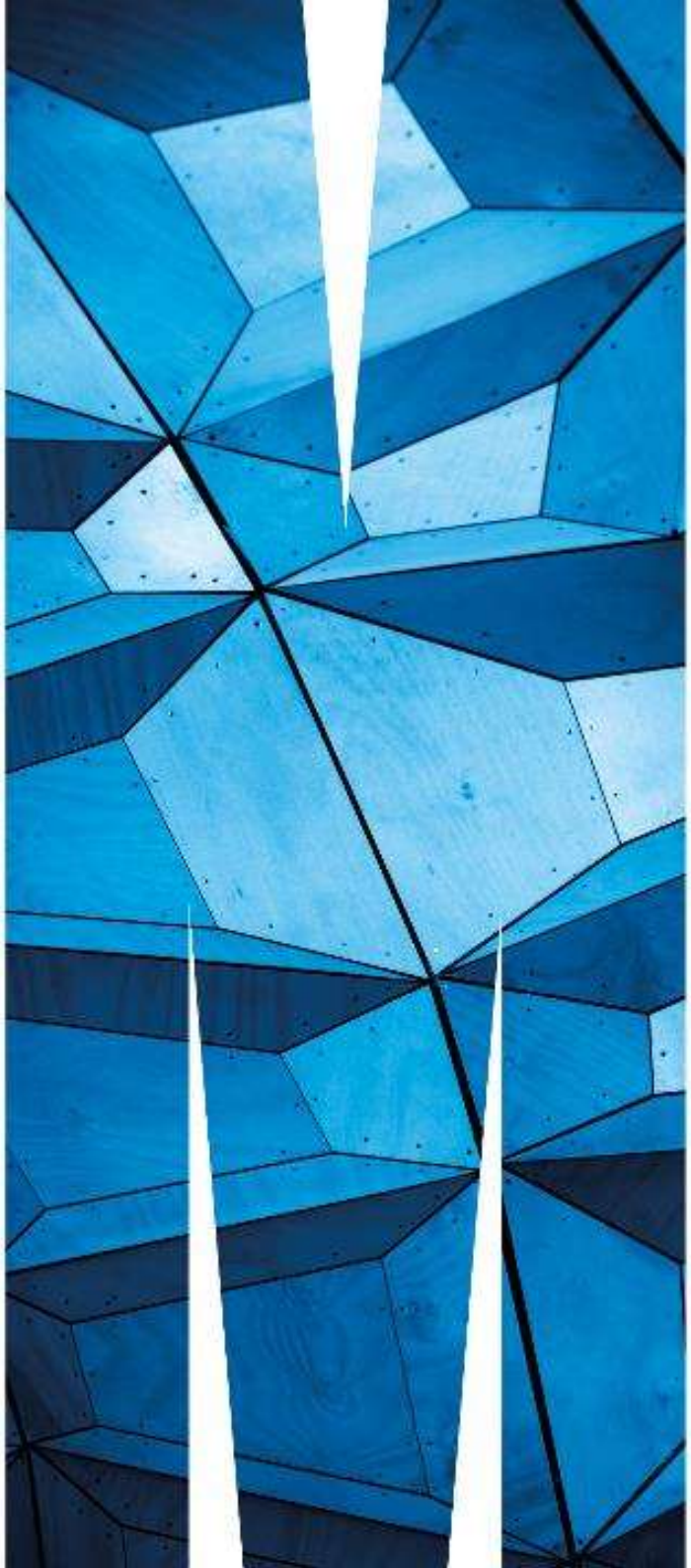
MONASH University

FIT1013 Digital Futures: IT for Business
Week 3: Advanced functions in Excel

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
- Use rounding functions

GROUP OF EIGHT AUSTRALIA



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

Working with Logical Functions

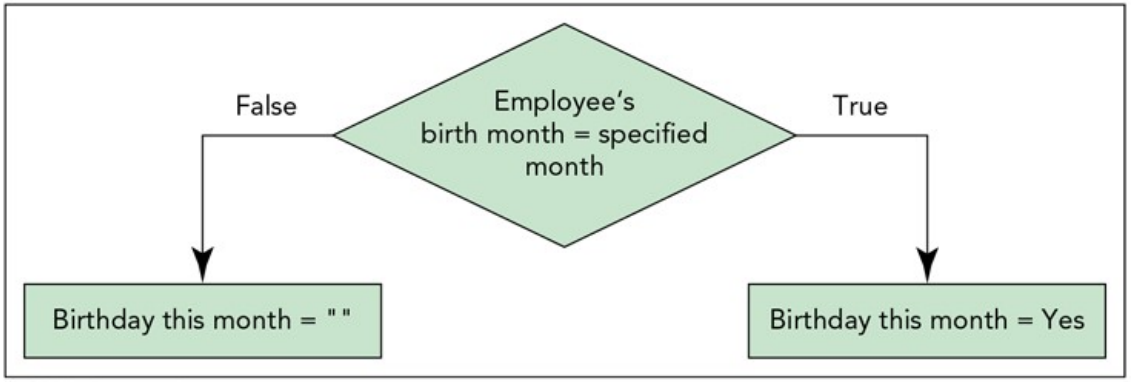
- To effectively communicate a table's function, keep the following guidelines in mind when creating fields in an Excel table:
  - Create fields that require the least maintenance
  - Store smallest unit of data possible in a field
  - Apply a text format to fields with numerical text data

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



Working with Logical Functions

Figure 8-3 Function Arguments dialog box for the IF function

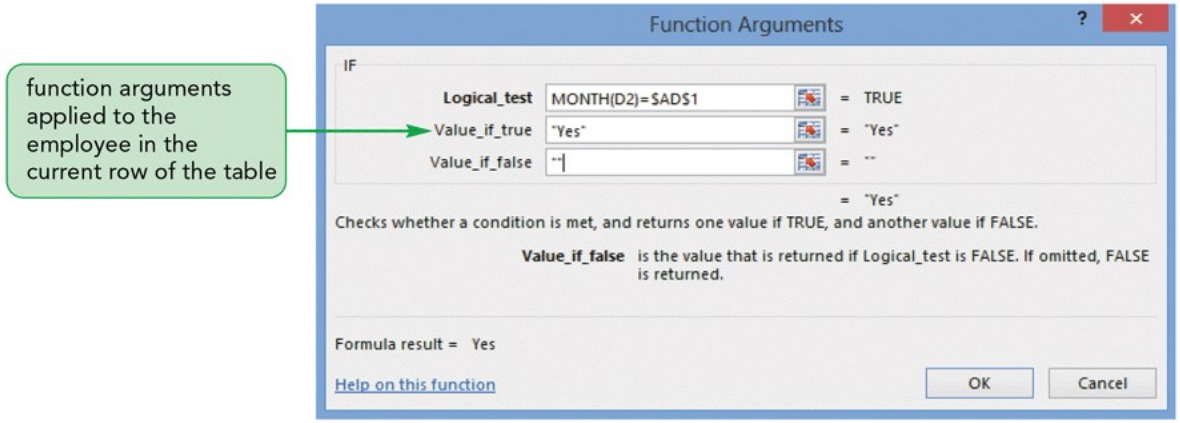
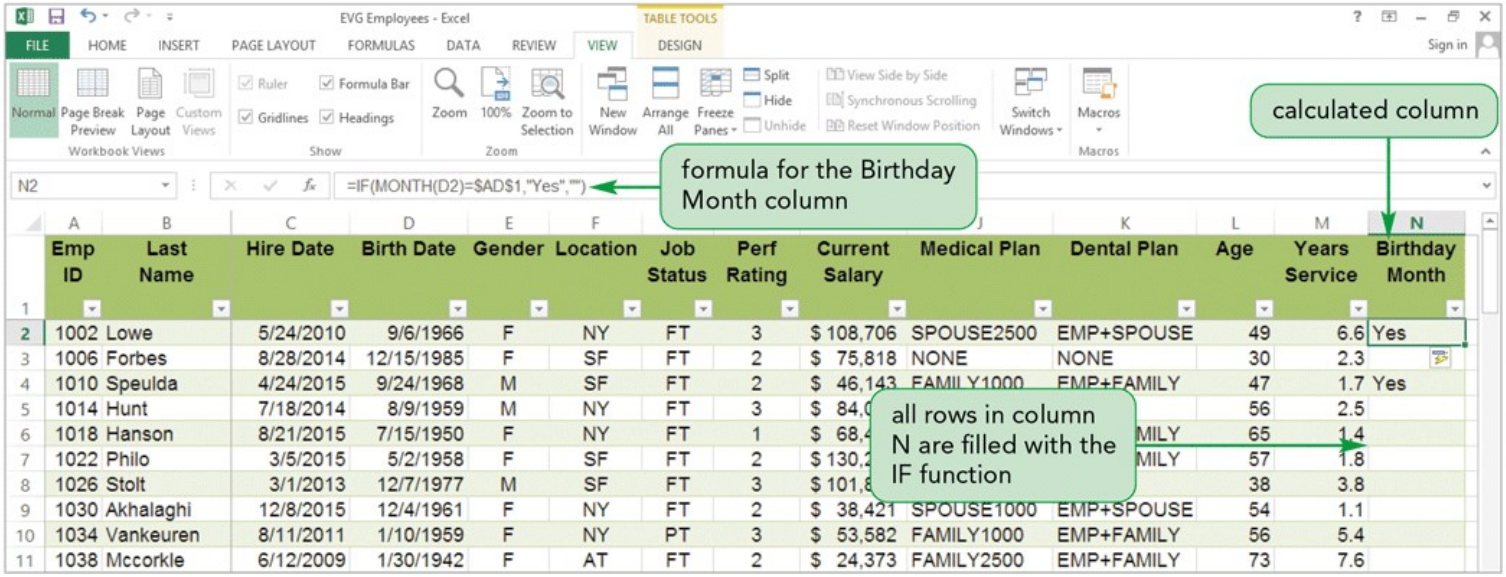


Figure 8-4 Birthday Month column added to the Employee table



	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
2	1002	Lowe	5/24/2010	9/6/1966	F	NY	FT	3	$ 108,706	SPOUSE2500	EMP+SPOUSE	49	6.6	Yes
3	1006	Forbes	8/28/2014	12/15/1985	F	SF	FT	2	$ 75,818	NONE	NONE	30	2.3	
4	1010	Speulda	4/24/2015	9/24/1968	M	SF	FT	2	$ 46,143	FAMILY1000	EMP+FAMILY	47	1.7	Yes
5	1014	Hunt	7/18/2014	8/9/1959	M	NY	FT	3	$ 84,0			56	2.5	
6	1018	Hanson	8/21/2015	7/15/1950	F	NY	FT	1	$ 68,4		MILY	65	1.4	
7	1022	Philo	3/5/2015	5/2/1958	F	SF	FT	2	$ 130,2		MILY	57	1.8	
8	1026	Stolt	3/1/2013	12/7/1977	M	SF	FT	3	$ 101,8			38	3.8	
9	1030	Akhalaghi	12/8/2015	12/4/1961	F	NY	FT	2	$ 38,421	SPOUSE1000	EMP+SPOUSE	54	1.1	
10	1034	Vankeuren	8/11/2011	1/10/1959	F	NY	PT	3	$ 53,582	FAMILY1000	EMP+FAMILY	56	5.4	
11	1038	Mccorkle	6/12/2009	1/30/1942	F	AT	FT	2	$ 24,373	FAMILY2500	EMP+FAMILY	73	7.6	

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:

AND(*logical1*[,*logical2*]...)

Working with Logical Functions

Figure 8-6 Flowchart illustrating AND logic for the 401(k) benefit

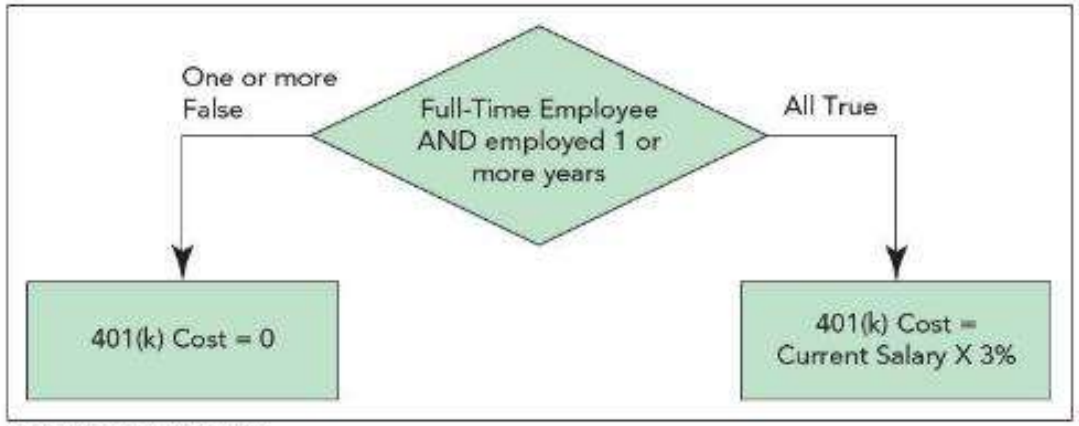
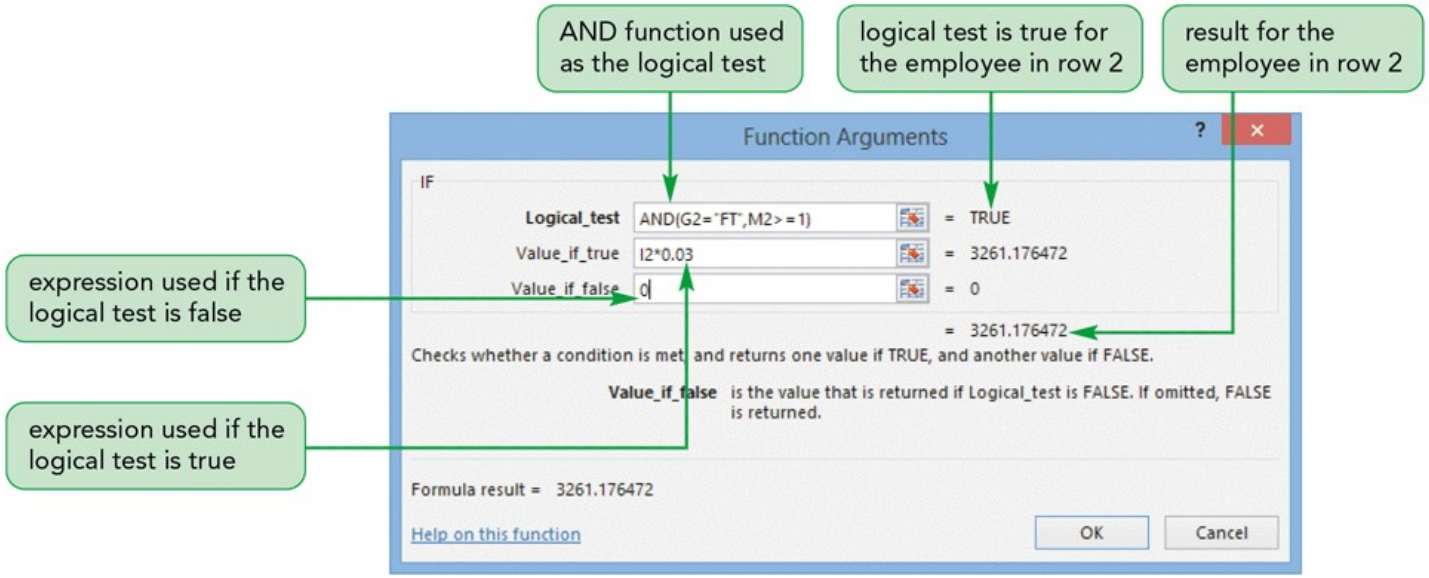


Figure 8-8 Function Arguments dialog box for the IF function with the AND function



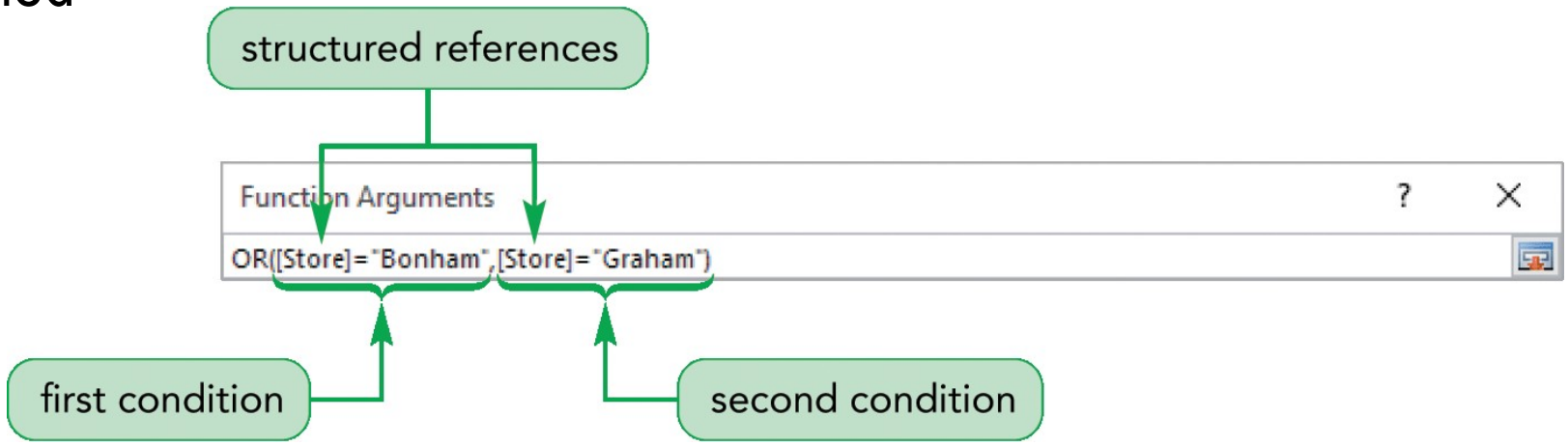
Working with Logical Functions

- 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:

    OR*(logical1[,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<=60,25,20)))
```

Data: cell B1 stores the driver's age

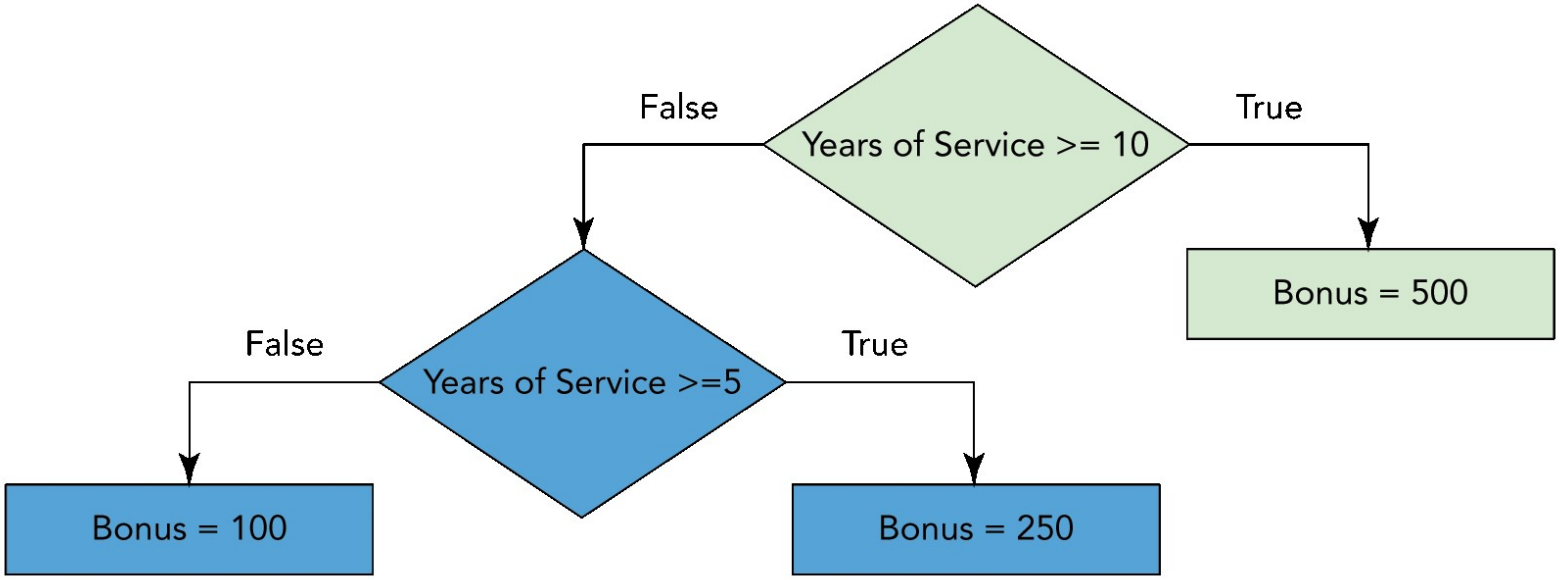
Example:

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

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])*

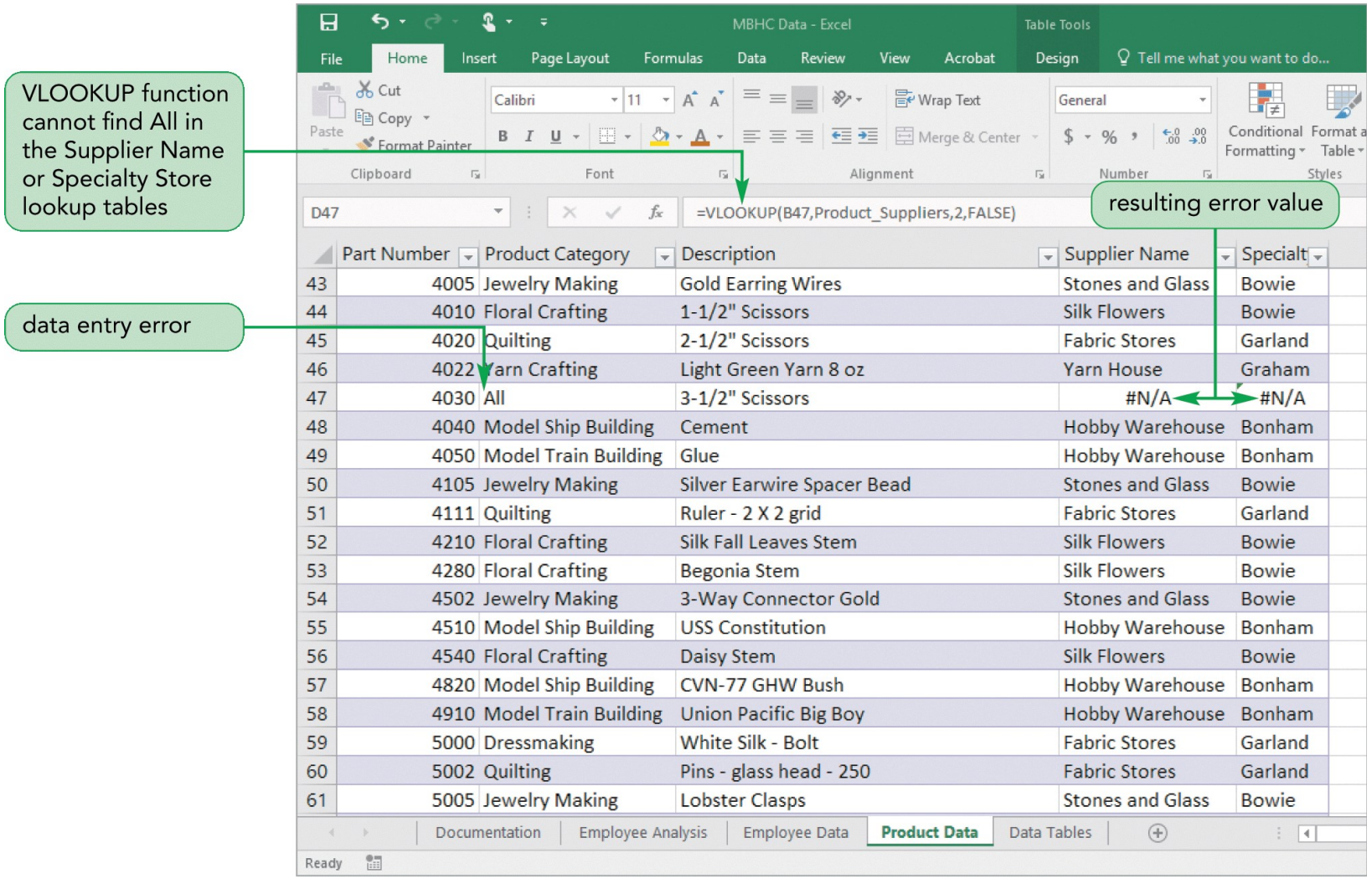
Using the IFERROR Function

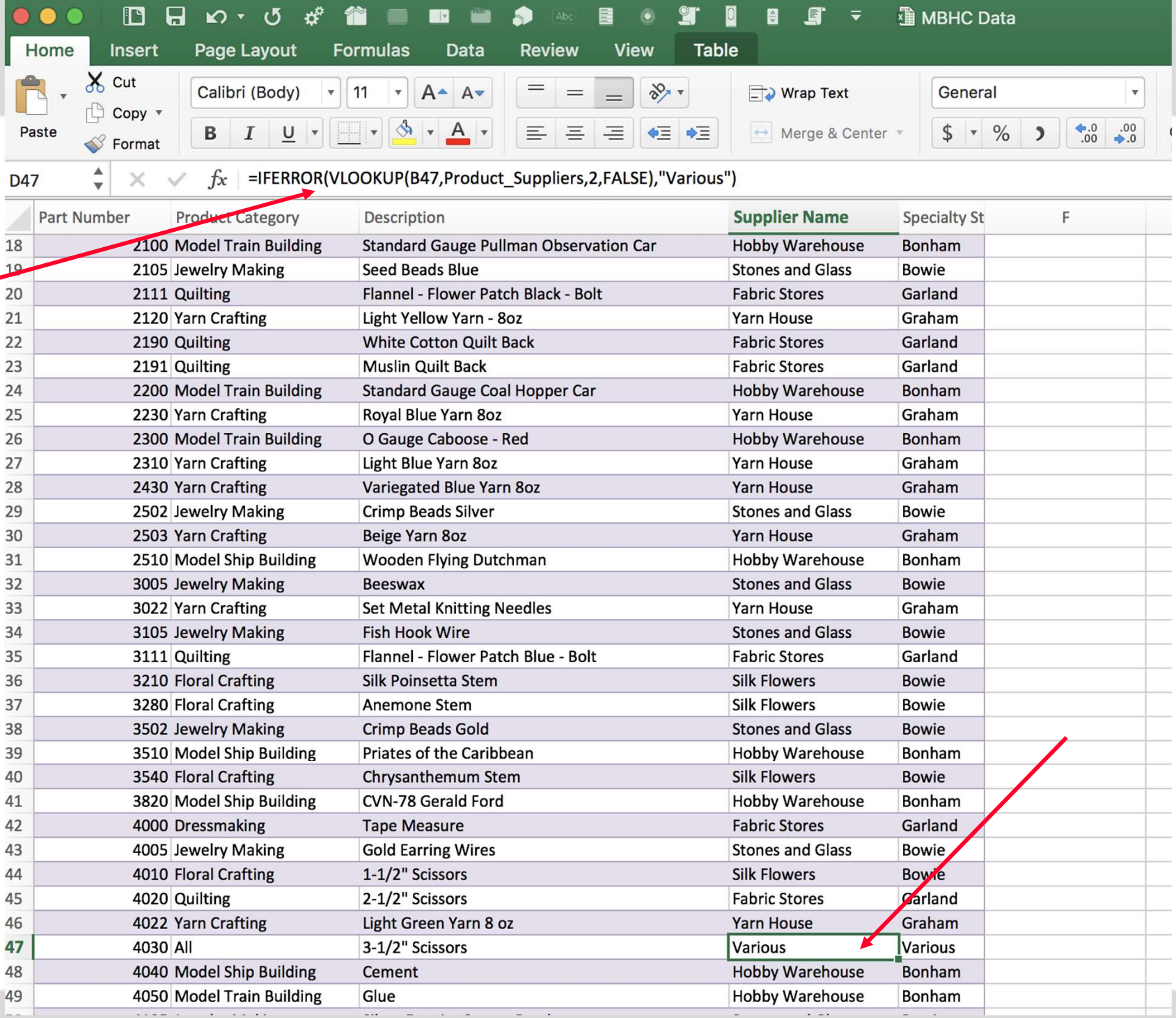
- Error values
  - Indicate that an element in a formula or a cell referenced in a formula is preventing Excel from returning a calculated value
  - Begin with a number sign (#) followed by an error name that indicates the type of error

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





	Part Number	Product Category	Description	Supplier Name	Specialty St	F
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 - 8oz	Yarn House	Graham	
22	2190	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 8oz	Yarn House	Graham	
26	2300	Model Train Building	O Gauge Caboose - Red	Hobby Warehouse	Bonham	
27	2310	Yarn Crafting	Light Blue Yarn 8oz	Yarn House	Graham	
28	2430	Yarn Crafting	Variegated Blue Yarn 8oz	Yarn House	Graham	
29	2502	Jewelry Making	Crimp Beads Silver	Stones and Glass	Bowie	
30	2503	Yarn Crafting	Beige Yarn 8oz	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	Priates 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	1-1/2" 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%

Using Round Functions

- Using the Round Function to round a number to a specified number of digits. For example, if cell A1 contains 23.7825, and you want to round that value to two decimal places, you can use the following formula:
- =ROUND(A1, 2)
- The result of this function is 23.78.
- Syntax:

  ROUND(number, num_digits)

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
- Next week
  - Develop an Excel application (Excel Module 7)