Using logical functions in formulas

DATA PREPARATION IN EXCEL

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Logical functions

- Test if a condition is true or false
- With logical functions, we can create conditional formulas
  - Choose conditions
  - Obtain different outputs
- Four logical functions
  - `AND()`
  - `OR()`
  - `NOT()`
  - `IF()`

The AND() function

`AND()`

- *Syntax:* `AND(logical1, [logical2], ...)`
- Tests one or more conditions and outputs:
  - `TRUE` if both conditions met
  - Otherwise, `FALSE`

Example - Identify records where product is Pears and total revenue is over $2,500.

Month	Product	Total Revenue	Pears Over $2,500
Jan-23	Apples	$ 1,801	FALSE
Jan-23	Oranges	$ 4,256	FALSE
Jan-23	Pears	$ 2,977	TRUE
Feb-23	Apples	$ 1,415	FALSE
Feb-23	Oranges	$ 2,243	FALSE
Feb-23	Pears	$ 4,690	TRUE
Mar-23	Apples	$ 4,110	FALSE
Mar-23	Oranges	$ 4,541	FALSE
Mar-23	Pears	$ 3,561	TRUE

```
=AND([@Product]="Pears",[@[Total Revenue]]>2500)
```

The OR() function

`OR()`

- *Syntax:* `OR(logical1, [logical2], ...)`
- Tests one or more conditions and outputs:
  - `TRUE` if at least one condition met
  - Otherwise, `FALSE`

Example - Identify records where product is Pears or total revenue is over $2,500.

Month	Product	Total Revenue	Pears Or Over $2,500
Jan-23	Apples	$ 1,801	FALSE
Jan-23	Oranges	$ 4,256	TRUE
Jan-23	Pears	$ 2,977	TRUE
Feb-23	Apples	$ 1,415	FALSE
Feb-23	Oranges	$ 2,243	FALSE
Feb-23	Pears	$ 4,690	TRUE
Mar-23	Apples	$ 4,110	TRUE
Mar-23	Oranges	$ 4,541	TRUE
Mar-23	Pears	$ 3,561	TRUE

```
=OR([@Product]="Pears",[@[Total Revenue]]>2500)
```

The NOT() function

`NOT()`

- *Syntax:* `NOT(logical)`
- Takes one logical argument
- Output is `TRUE` when the opposite of the condition is true
- Otherwise output is `FALSE`

Example - Identify records where total revenue is $2,500 or less.

Month	Product	Total Revenue	$2,500 or Less
Jan-23	Apples	$ 1,801	TRUE
Jan-23	Oranges	$ 4,256	FALSE
Jan-23	Pears	$ 2,977	FALSE
Feb-23	Apples	$ 1,415	TRUE
Feb-23	Oranges	$ 2,243	TRUE
Feb-23	Pears	$ 4,690	FALSE
Mar-23	Apples	$ 4,110	FALSE
Mar-23	Oranges	$ 4,541	FALSE
Mar-23	Pears	$ 3,561	FALSE

=NOT([@[Total Revenue]]>2500)

The IF() function

`IF()`

- *Syntax:*

```
IF(logical_test, [value_if_true], [value_if_false])
```

- Apply different outcomes based on logical test result

- Real-life scenario - going to the shops
  - Is it raining?
    - Yes - take an umbrella
    - No - leave umbrella at home

Combining logical functions

- Test multiple conditions to find true or false outcomes
- Combine logical functions to create nested formulas
  - Multiple conditions to produce two outcomes

IF plus AND functions

```
=IF(AND(logical1, [logical2], ...),
[value_if_true], [value_if_false])
```

IF plus OR functions

```
=IF(OR(logical1, [logical2], ...),
[value_if_true], [value_if_false])
```

IF plus NOT functions

```
=IF(NOT(logical), [value_if_true],
[value_if_false])
```

Combining IF() functions

- Create nested IF formulas:

```
=IF(logical_test, [value_if_true],
IF(logical_test, [value_if_true],
[value_if_false])
```

- Real life scenario - weather check
  - Is it snowing?
    - Yes - wear a winter jacket
    - No - is it raining?
      - Yes - use an umbrella
      - No - wear normal outdoor clothes

Let's practice!

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Logical data preparation

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