



Excel Chapter 7: Advanced Functions for Text and Analysis



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Learning Objectives

- After studying this chapter, you will be able to:
 - ▲ Use functions to format text
 - ▲ Create conditional functions using IF and IFS criteria
 - ▲ Create formulas using nested functions
 - ▲ Find and correct errors in formulas
 - ▲ Use 3-D cell references in formulas

Using Functions to Modify Text

- Text functions let you change text entries
- Changing case
 - ▲ PROPER converts only the first letter to uppercase
 - ▲ UPPER converts all letters to uppercase
 - ▲ LOWER converts all letters to lowercase

| | A | B | C |
|---|----------------------|----------------|----------------------|
| 1 | Text | Formula | Result |
| 2 | use your IMAGINATION | =PROPER(A2) | Use Your Imagination |
| 3 | | =LOWER("AND") | and |
| 4 | make some magic! | =UPPER(A4) | MAKE SOME MAGIC! |

Using Functions to Modify Text (cont.)

■ Extracting text

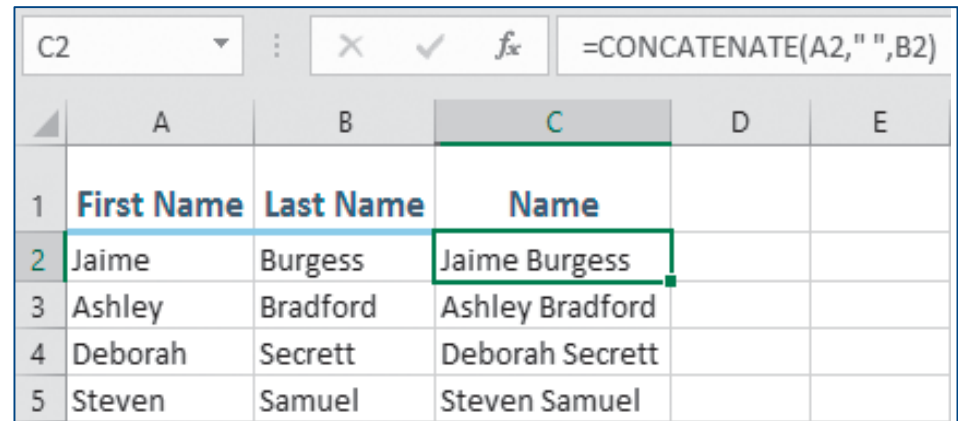
- ▲ LEFT, MID, RIGHT removes a specified number of characters
- ▲ TRIM leaves only a single space between words

| | A | B | C |
|---|-----------------------|--------------|-----------------------|
| 1 | Text | Formula | Result |
| 2 | BASKabcdefg | =LEFT(A2,4) | BASK |
| 3 | abcdefgETB | =RIGHT(A3,3) | ETB |
| 4 | abcALLdefg | =MID(A4,4,3) | ALL |
| 5 | Who likes basketball? | =TRIM(A5) | Who likes basketball? |

Using Functions to Modify Text (cont.)

■ CONCATENATE

combines two or more separate text entries into one cell

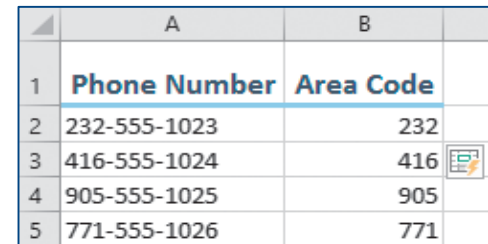


The screenshot shows an Excel spreadsheet with columns A, B, and C. Column A is labeled 'First Name', column B is labeled 'Last Name', and column C is labeled 'Name'. The formula bar at the top shows the formula `=CONCATENATE(A2," ",B2)`. The data in the table is as follows:

| | A | B | C | D | E |
|---|------------|-----------|-----------------|---|---|
| 1 | First Name | Last Name | Name | | |
| 2 | Jaime | Burgess | Jaime Burgess | | |
| 3 | Ashley | Bradford | Ashley Bradford | | |
| 4 | Deborah | Secrett | Deborah Secrett | | |
| 5 | Steven | Samuel | Steven Samuel | | |

■ Flash Fill options

- ▲ Extracts one part of a cell only
- ▲ Inserts text into a cell
- ▲ Combines two names into one cell
- ▲ Separates one name into two cells



The screenshot shows an Excel spreadsheet with columns A and B. Column A is labeled 'Phone Number' and column B is labeled 'Area Code'. The data in the table is as follows:

| | A | B |
|---|--------------|-----------|
| 1 | Phone Number | Area Code |
| 2 | 232-555-1023 | 232 |
| 3 | 416-555-1024 | 416 |
| 4 | 905-555-1025 | 905 |
| 5 | 771-555-1026 | 771 |



Using Functions to Modify Text (cont.)

■ Other text functions

| TEXT FUNCTIONS | | |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| Function | Description | Example |
| REPLACE | Replaces part of a text string with a different text string; for example, replacing digits in a credit card number to display 8181-xxxx-xxxx-1188 | Cell B1: 8181-3011-1103-1188 Formula: =REPLACE(B1,6,9,"xxxx-xxxx") Result: 8181-xxxx-xxxx-1188 |
| SUBSTITUTE | Looks for an exact match (case-sensitive) and replaces old text with new text if found; for example, replacing Mgr with Manager | Cell B4: Mgr Formula: =SUBSTITUTE(B4,"Mgr","Manager") Result: Manager |
| LEN | Determines the number of characters in a cell entry | Cell B7: 2223334444 Formula: =LEN(B7) Result: 10 |
| REPT | Repeats text, for example, repeating the letter A five times | Formula: =REPT("A",5) Result: AAAAA |



Conditional Functions Using IF Criteria

- Conditional functions: SUM, COUNT, AVERAGE
- IF uses one criterion; IFS use multiple criteria

IF CRITERIA FUNCTIONS

| Function | Arguments [Optional] |
|------------|-----------------------------------------------------------------|
| SUMIF | =SUMIF(range,criteria,[sum range]) |
| AVERAGEIF | =AVERAGEIF(range,criteria,[average range]) |
| COUNTIF | =COUNTIF(range,criteria) |
| SUMIFS | =SUMIFS(sum range,range1,criteria1,range2,criteria2...) |
| AVERAGEIFS | =AVERAGEIFS(average range,range1,criteria1,range2,criteria2...) |
| COUNTIFS | =COUNTIFS(range1,criteria1,range2,criteria2...) |

Conditional Functions Using IF Criteria (cont.)

■ IF Function Syntax

IF CRITERIA FUNCTION ARGUMENTS

| Arguments | Description |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Range | These are the cells to be compared with the criteria. |
| Criteria | They can be a comparison value or text, or an expression using a comparison operator such as =, >, <, >=, <=, <> (not equal to). |
| Sum range | (Optional) This is the range to be summed, which can be different from the range being compared with the criteria. If Sum range is omitted, the range is summed. |
| Average range | (Optional) Like Sum range, this is the range to be averaged. |

Conditional Functions Using IF Criteria (cont.)

- Function arguments dialog box displays criteria and a preview of the formula result

Formula bar displays the formula

The screenshot shows an Excel spreadsheet with a table of sales data. The formula bar at the top displays the formula: `=SUMIFS(C3:C12,A3:A12,2152,B3:B12,"San Antonio")`. Below the formula bar, the 'Function Arguments' dialog box for the SUMIFS function is open. The dialog box shows the following arguments:

| Argument | Value | Preview |
|-----------------|---------------|---------------------------------------------------------------------|
| Sum_range | C3:C12 | = {5083;13156;10096} |
| Criteria_range1 | A3:A12 | = {2151;2152;2152;2153;2153;2151} |
| Criteria1 | 2152 | = 2152 |
| Criteria_range2 | B3:B12 | = {"Detroit";"Chicago";"Detroit";"Chicago";"Chicago";"San Antonio"} |
| Criteria2 | "San Antonio" | = "San Antonio" |
| | | = 18736 |

Multiple criteria and their ranges

Preview of the formula result

Nested Functions

- Create one function inside another function

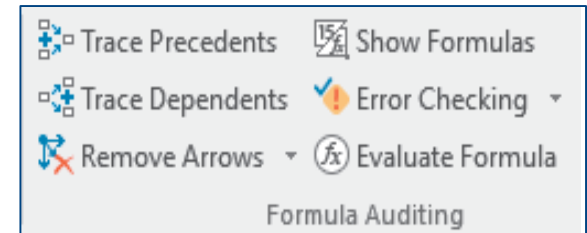
▲ Example: AVERAGE function nested inside a ROUND function



Formula first finds the average for the range, then rounds the results

Troubleshooting Formulas

- Trace Precedents and Trace Dependents auditing tools help identify cells used in a formula



- Trace Precedents works backwards to show which cells affect the formula result

| Name | Goal | Sales | # Sales |
|------------------|----------|----------|----------|
| Bert | \$ 1,000 | \$ 900 | 18 |
| Ernie | 1,200 | 1,300 | 12 |
| Jen | 800 | 950 | 21 |
| Sarah | 1,000 | 1,200 | 17 |
| Total | \$ 4,000 | \$ 4,350 | 68 |
| Sales Above Goal | | | \$ 350 |
| Average Sale | | | \$ 63.97 |



Troubleshooting Formulas (cont.)

- Trace Dependents looks forward to show any cells using the current formula cell

| Name | Goal | Sales | # Sales |
|------------------|----------|----------|---------|
| Bert | \$ 1,000 | \$ 900 | 18 |
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| Total | \$ 4,000 | \$ 4,350 | 68 |
| Sales Above Goal | | \$ 350 | |
| Average Sale | | \$ 63.97 | |

Tracing your formulas

- ▲ Check accuracy with tracer arrows
- ▲ Trace a cell or a formula
- ▲ Continue clicking Trace Precedents or Trace Dependents button to see all references

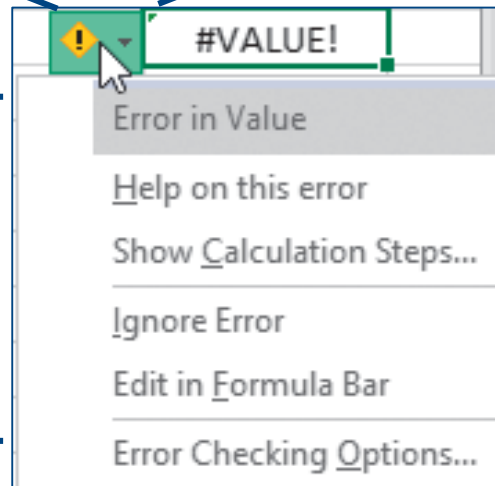
Checking for Errors

- Error Checking tool spots and corrects formula errors
- Indicated by a green indicator triangle in upper-left of cell

Warning sign displays after clicking cell with error

Green error indicator triangle

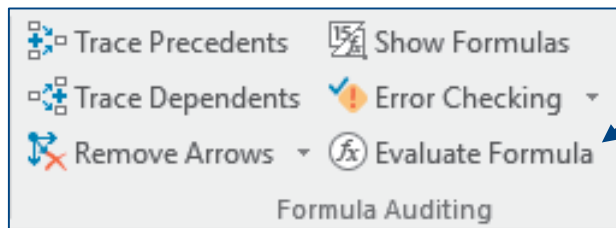
Warning sign options



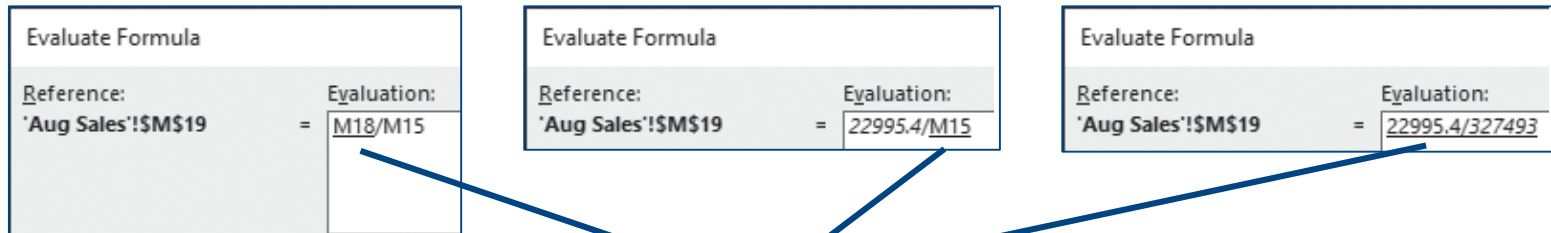
Checking for Errors (cont.)

■ Evaluate a formula

▲ Formula auditing tool



▲ Breaks down a formula into steps



Underlining indicates which step is being evaluated.



3-D Cell References

- Referring to data in a range of sheets instead of a cell in individual sheets is faster to create
 - ▲ Formula comparison:
=SUM(January!A5+February!A5+March!A5)
=SUM(January:March!A5)
- Data on new inserted sheets in the range automatically are included in formula