CIS100 Test 2 Review
CIS100 Previous Functions

• **Mathematical Functions**
  • SUM

• **Statistical Functions**
  • AVERAGE
  • COUNT
  • COUNTA
  • MAX
  • MIN
CIS100 Test 2 New Functions

• **Logical Functions**
  - AND
  - OR
  - NOT
  - IF

• **Mathematical Functions**
  - ROUND
  - INT

• **Statistical Functions**
  - LARGE
  - SMALL
  - MEDIAN
Microsoft® Excel® Logical Functions

**AND**

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

**OR**

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

**NOT**

\[ = \text{NOT}(\text{logical}) \]

**IF**

\[ = \text{IF}(\text{logical}_{-}\text{test, [value}_{-}\text{if}_{-}\text{true}, [value}_{-}\text{if}_{-}\text{false}]) \]
The **AND** function

Syntax:

```
=AND(logical1, [logical2], ...)
```

Arguments:

- **logical1**  Required
  - The first condition that you want to test that can evaluate to either TRUE or FALSE.
- **logical2, ...**  Optional
  - Additional conditions that you want to test that can evaluate to either TRUE or FALSE, up to a maximum of 255 conditions.
The **AND** function

**Description:**

- Returns FALSE if one or more arguments is FALSE
- Otherwise, all arguments must evaluate TRUE

**Remarks:**

- Arguments must evaluate to logical values
- Arguments must be arrays or references that contain logical values
- Text and empty cells are ignored in arrays or references

**Errors:**

#VALUE – If no logical values exist in a specified range
The **AND** function – EXAMPLE 1

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Formula</strong></td>
<td><strong>Description</strong></td>
<td><strong>Result</strong></td>
</tr>
<tr>
<td>2</td>
<td>=AND(TRUE, TRUE)</td>
<td>All arguments are TRUE</td>
<td>TRUE</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>=AND(TRUE, FALSE)</td>
<td>One argument is FALSE</td>
<td>FALSE</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>=AND(2-2=4, 2+3=5)</td>
<td>All arguments evaluate to TRUE</td>
<td>TRUE</td>
</tr>
</tbody>
</table>

Microsoft® Excel® Logical Functions
# The **AND** function – EXAMPLE 2

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Data</td>
<td>Formula</td>
<td>Result</td>
</tr>
<tr>
<td>2</td>
<td>=AND(1, A2, A2&lt;100)</td>
<td>Displays TRUE if the number in cell A2 is between 1 and 100. Otherwise, it displays FALSE.</td>
<td>TRUE</td>
</tr>
<tr>
<td>3</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>=IF(AND(1, A4, A4&lt;100), A4, &quot;The value is out of range.&quot;)</td>
<td>Displays the number in cell A4, if it is between 1 and 100. Otherwise, it displays the message &quot;The value is out of range.&quot;</td>
<td>The value is out of range.</td>
</tr>
<tr>
<td>5</td>
<td>104</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>=IF(AND(1, A2, A2&lt;100), A2, &quot;The value is out of range.&quot;)</td>
<td>Displays the number in cell A2, if it is between 1 and 100. Otherwise, it displays a message.</td>
<td>50</td>
</tr>
</tbody>
</table>

Microsoft® Excel® Logical Functions
The **OR** function

**Syntax:**

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

**Arguments:**

- **logical1**  Required
  - The first condition that you want to test that can evaluate to either TRUE or FALSE.
- **logical2, ...**  Optional
  - Additional conditions that you want to test that can evaluate to either TRUE or FALSE, up to a maximum of 255 conditions.
The **OR** function

**Description:**
- Returns TRUE if one or more arguments is TRUE
- Otherwise, all arguments must evaluate FALSE

**Remarks:**
- Arguments must evaluate to logical values
- Arguments must be arrays or references that contain logical values
- Text and empty cells are ignored in arrays or references

**Errors:**
- #VALUE – If no logical values exist in a specified range

Microsoft® Excel® Logical Functions
The **OR** function

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formula</td>
<td>Description</td>
<td>Result</td>
</tr>
<tr>
<td>=OR(TRUE)</td>
<td>One argument is TRUE</td>
<td>TRUE</td>
</tr>
<tr>
<td>=OR(1+1=1,2+2=5)</td>
<td>All arguments evaluate to FALSE</td>
<td>FALSE</td>
</tr>
<tr>
<td>=OR(TRUE, FALSE, TRUE)</td>
<td>At least one argument is TRUE</td>
<td>TRUE</td>
</tr>
</tbody>
</table>
The **NOT** function

Syntax:

`=NOT(logical)`

Arguments:

- **logical**  Required
  - A value or expression that can be evaluated to TRUE or FALSE.
The **NOT** function

**Description:**

- Reverses the value of its argument.

**Remarks:**

- If logical is FALSE, NOT returns TRUE
- If logical is TRUE, NOT returns FALSE

**Errors:**

*None*
The **NOT** function

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Formula</strong></td>
<td><strong>Description</strong></td>
<td><strong>Result</strong></td>
</tr>
<tr>
<td>2</td>
<td>=NOT(FALSE)</td>
<td>Reverses FALSE</td>
<td>TRUE</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>=NOT(1+1=2)</td>
<td>Reverses an equation that evaluates to</td>
<td>FALSE</td>
</tr>
</tbody>
</table>
The **IF** function

Syntax:

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

Arguments:

- **logical_test** Required
  - Any value or expression that can be evaluated to TRUE or FALSE.
- **value_if_true** Optional
  - The value that you want to be returned if the logical_test argument evaluates to TRUE.
  - If logical_test evaluates to TRUE and the value_if_true argument is omitted (that is, there is only a comma following the logical_test argument), the IF function returns 0 (zero).
  - To display the word TRUE, use the logical value TRUE for the value_if_true argument.
The **IF** function

Syntax:

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

Arguments:

- **value_if_false**  Optional
  - The value that you want to be returned if the `logical_test` argument evaluates to FALSE.
  - If `logical_test` evaluates to FALSE and the `value_if_false` argument is omitted, (that is, there is no comma following the `value_if_true` argument), the IF function returns the logical value FALSE.
  - If `logical_test` evaluates to FALSE and the value of the `value_if_false` argument is omitted (that is, in the IF function, there is a comma following the `value_if_true` argument), the IF function returns the value 0 (zero).
The **IF** function

**Description:**

• The IF function returns one value if a condition you specify evaluates to TRUE, and another value if that condition evaluates to FALSE.

**Remarks:**

• Up to 7 IF functions can be nested as value_if_true and value_if_false arguments to construct more elaborate tests. (2003)
• Up to 64 IF functions can be nested as value_if_true and value_if_false arguments to construct more elaborate tests. (2007)
• If any of the arguments to IF are arrays, every element of the array is evaluated when the IF statement is carried out.

**Errors:**

*None*
The **IF** function

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Actual Expenses</td>
<td>Predicted Expenses</td>
<td>Formula</td>
<td>Description</td>
</tr>
<tr>
<td>1</td>
<td>1500</td>
<td>900</td>
<td>=IF(A2&gt;B2,&quot;Over Budget&quot;,&quot;OK&quot;)</td>
<td>Checks whether the first row is over budget</td>
</tr>
<tr>
<td>2</td>
<td>500</td>
<td>900</td>
<td>=IF(A3&gt;B3,&quot;Over Budget&quot;,&quot;OK&quot;)</td>
<td>Checks whether the second row is over budget</td>
</tr>
<tr>
<td>3</td>
<td>500</td>
<td>925</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Microsoft® Excel® Logical Functions
Microsoft® Excel®
Mathematical Functions

**ROUND**
=ROUND(number,num_digits)

**INT**
=INT(number)
The **ROUND** function

Syntax:

\[=\text{ROUND}(\text{number, num_digits})\]

Arguments:

- **number**  Required
  - The number that you want to round.
- **num_digits**  Required
  - The number of digits to which you want to round the number argument.
The **ROUND** function

**Description:**

• Rounds a number to a specified number of digits.

**Remarks:**

• If num_digits is greater than 0 (zero), then number is rounded to the specified number of decimal places.
• If num_digits is 0, the number is rounded to the nearest integer.
• If num_digits is less than 0, the number is rounded to the left of the decimal point.

**Errors:**

*None*
## The **ROUND** function

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Formula</strong></td>
<td><strong>Description</strong></td>
</tr>
<tr>
<td>2</td>
<td>=ROUND(2.15, 1)</td>
<td>Rounds 2.15 to one decimal place</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>=ROUND(2.149, 1)</td>
<td>Rounds 2.149 to one decimal place</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>=ROUND(-1.475, 2)</td>
<td>Rounds -1.475 to two decimal places</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>=ROUND(21.5, -1)</td>
<td>Rounds 21.5 to one decimal place to the left of the decimal</td>
</tr>
</tbody>
</table>
The **INT** function

Syntax:

\[ =\text{INT}(\text{number}) \]

Arguments:

- **number**  Required
  - The real number that you want to round down to an integer.
The **INT** function

**Description:**

- Rounds a number down to the nearest integer.

**Remarks:**

*None*

**Errors:**

*None*
The **INT** function

\[=\text{INT}(8.9)\]
The **INT** function

=INT(8.9)  
=8
The **INT** function

\[ =\text{INT}(-8.9) \]
The **INT** function

\[=\text{INT}(-8.9)\]

\[= -9\]
The **INT** function

<table>
<thead>
<tr>
<th>A</th>
<th>19.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
</tr>
</tbody>
</table>

\[ \text{=A2-INT(A2)} \]

Microsoft® Excel® Mathematical Functions
The **INT** function

<table>
<thead>
<tr>
<th>A</th>
<th>19.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

\[=A2-\text{INT}(A2)\]
\[=19.5-19\]
\[=0.5\]
Microsoft® Excel®
Statistical Functions

LARGE

=LARGE(array,k)

SMALL

=SMALL(array,k)

MEDIAN

=MEDIAN(number1, number2, …)
The **LARGE** function

**Syntax:**

\[ =\text{LARGE}(\text{array},k) \]

**Arguments:**

- **array**  Required
  - The array or range of data for which you want to determine the k-th largest value.
- **k**  Required
  - The position (from the largest) in the array or cell range of data to return.
The **LARGE** function

**Description:**
- Returns the k-th largest value in a data set.

**Remarks:**
- If \( n \) is the number of data points in a range, then `LARGE(array,1)` returns the largest value.
- If \( n \) is the number of data points in a range, then `LARGE(array,n)` returns the smallest value.

**Errors:**
- #NUM! – If array is empty
- #NUM! – If \( k \leq 0 \)
- #NUM! – If \( k \) is greater than the number of data points
3rd largest number in the numbers in columns A and B

=\text{LARGE}(\text{array}, k)
3rd largest number in the numbers in columns A and B

=LARGE(array,k)
=LARGE(A2:B6)
3rd largest number in the numbers in columns A and B

= LARGE(array, k)
= LARGE(A2:B6, 3)
3rd largest number in the numbers in columns A and B

List the numbers in descending order:
7
6
5
5
4
4
4
3
3
2

=LARGE(array,k)
=LARGE(A2:B6,3)

=5
7th largest number in the numbers in columns A and B

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Data</td>
<td>Data</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>7</td>
</tr>
</tbody>
</table>

=\text{LARGE}(\text{array},k)
7th largest number in the numbers in columns A and B

= LARGE(array, k)
= LARGE(A2:B6)
7th largest number in the numbers in columns A and B

= LARGE(array, k) = LARGE(A2:B6, 7)
7th largest number in the numbers in columns A and B

= LARGE(array, k)
= LARGE(A2:B6, 7)

List the numbers in descending order:
7
6
5
5
4
4
4
3
3
2
7th largest number in the numbers in columns A and B

= LARGE(array, k)
= LARGE(A2:B6, 7)

List the numbers in descending order:
7
6
5
5
4
4
4
3
3
2

=4
The **SMALL** function

Syntax:

\[
=\text{SMALL}(\text{array}, k)
\]

Arguments:

- **array** Required
  - The array or range of data for which you want to determine the k-th smallest value.
- **k** Required
  - The position (from the smallest) in the array or cell range of data to return.
The **SMALL** function

**Description:**

- Returns the k-th smallest value in a data set.

**Remarks:**

- If $n$ is the number of data points in a range, then SMALL(array,1) returns the smallest value.
- If $n$ is the number of data points in a range, then SMALL(array,$n$) returns the largest value.

**Errors:**

- #NUM! – If array is empty
- #NUM! – If $k \leq 0$
- #NUM! – If $k$ is greater than the number of data points
4th smallest number in first column

=SMALL(array,k)
4th smallest number in first column

=SMALL(array,k)
=SMALL(A2:A10}
4th smallest number in first column

List the numbers in ascending order:

- 2
- 3
- 3
- 4
- 4
- 4
- 5
- 6
- 7

=SMALL(array,k)
=SMALL(A2:A10,4)
=SMALL(array,k) =SMALL(A2:A10,4)

4th smallest number in first column

List the numbers in ascending order:
2 3 3 4 4 4 5 6 7
2nd smallest number in second column

=SMALL(array,k)
2nd smallest number in second column

```
<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Data</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>7</td>
</tr>
</tbody>
</table>
```

`=SMALL(array,k)
`=SMALL(B2:B10)
2nd smallest number in second column

List the numbers in ascending order:

1
3
4
7
8
8
12
23
54

=SMALL(array,k)
=SMALL(B2:B10,2)
2nd smallest number in second column

List the numbers in ascending order:

1
3
4
7
8
8
12
23
54

=SMALL(array,k) =SMALL(B2:B10,2)

=3
The **MEDIAN** function

Syntax:

=MEDIAN(number1, number2, …)

Arguments:

• **number1**  Required
  ▪ 1 to 255 numbers for which you want the median.
• **number2, …**  Optional
  ▪ 1 to 255 numbers for which you want the median.
The **MEDIAN** function

**Description:**

- Returns the median of the given numbers.

**Remarks:**

- The median is the number in the middle of a set of numbers.
- If there is an even number of numbers in the set, then MEDIAN calculates the average of the two numbers in the middle.
- Arguments can either be numbers or names, arrays, or references that contain numbers.
- Logical values and text representations of numbers that you type directly into the list of arguments are counted.
- If an array or reference argument contains text, logical values, or empty cells, those values are ignored; however, cells with the value zero are included.

**Errors:**

Arguments that are error values or text that cannot be translated into numbers cause errors.
The **MEDIAN** function

<table>
<thead>
<tr>
<th></th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
</tr>
</tbody>
</table>

=MEDIAN(A1:A5)
The **MEDIAN** function

<table>
<thead>
<tr>
<th></th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
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<td>3</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
</tr>
</tbody>
</table>

=MEDIAN(A1:A5)  
=3
The **MEDIAN** function

=MEDIAN(A1:A6)
The **MEDIAN** function

<table>
<thead>
<tr>
<th>A</th>
</tr>
</thead>
</table>
| 1 | 1 
| 2 | 2 
| 3 | 3 
| 4 | 4 
| 5 | 5 
| 6 | 6 
| 7 | 7 

=MEDIAN(A1:A6) 
=3.5