

# **Introduction to Computer Applications**

**CISY 1225**

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## **General**

- If you are not registered
  - Please do the registration ASAP
  - Must submit all exercises/Projects via MyITLab

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# CISY 1225 Custom book

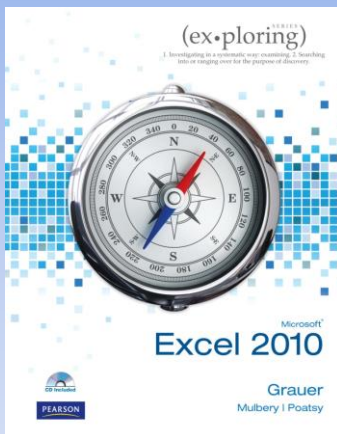
## Chapter 6 Formulas and Functions

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## Exploring Microsoft Office Excel 2010

by Robert Grauer, Keith Mulbery,  
and Mary Anne Poatsy



## Chapter 2 Formulas and Functions

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## Objectives

- How to use
  - semi-selection to create a formula
  - relative, absolute, and mixed cell references in formulas
  - date functions
  - lookup functions
  - range names in formulas
- Create and maintain range names

## Objectives (continued)

- Avoid circular references
- Insert a function
- Insert basic statistical functions
- Total values with the SUM function
- Determine results with the IF function
- Calculate payments with the PMT function

## Using Semi-Selection to Create a Formula

- **Semi-selection** uses the mouse pointer
  - to build a formula containing cell references or ranges
- This technique is also called **pointing**

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## Cell References

- Excel offers three types of cell references for use when a formula is copied
  - **Absolute**     \$A\$1
  - **Relative**     A1
  - **Mixed**       \$A1 or A\$1
- \$ indicates that the row number or column letter will not be modified during a copy

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## Relative Cell References

- When the formula shown in the formula bar is copied, relative address A8 is modified

Original formula entered in cell F2

Relative cell references in original formula

Cell references adjusted in copied formulas

	A	B	C	D	E	F	G
				House Cost	Down Payment	Amount Financed	Amount Financed
1	Input Area						
2	# Pmts Per Year	12	\$400,000	\$80,000	\$320,000	=D2-E2	
3	PMI Rate	0.5%	\$350,000	\$70,000	\$280,000	=D3-E3	
4	Down Pmt Rate	20.0%	\$175,500	\$35,100	\$140,400	=D4-E4	

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## Absolute Cell References

- When the formula shown in the formula bar is copied, absolute address  $\$B\$5$  is fixed

Original formula entered in cell B8

Absolute cell references in original formula

Cell references adjusted in copied formulas

	A	B	C	D	E	F	G	H	I	J	K
	Input Area										
1											
2	Today's Date	5/7/2012									
3	# Pmts Per Year	12									
4	PMI Rate	0.3%									
5	Down Pmt. Rate	20.0%									
6											
7	House Cost	Down Payment	Amount Financed								
8	\$400,000	\$80,000	\$320,000								
9	\$350,000	\$70,000	\$280,000								
10	\$175,500	\$35,100	\$140,400								
11	\$265,950	\$53,190	\$212,760								
12	\$329,750	\$65,950	\$263,800								

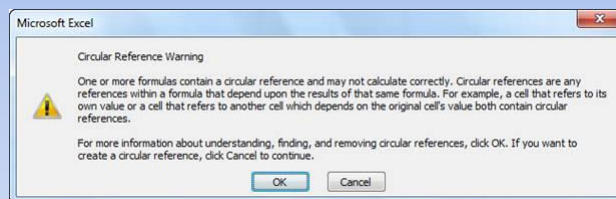
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## Mixed Cell References

- In **mixed reference** \$A1, the column is fixed,
  - but the row may be altered during a copy
- In **mixed reference** A\$1, the row is fixed,
  - but the column may be altered during a copy
- F4 key toggles
  - through relative, absolute, and mixed references

## Avoiding Circular References

- A **circular reference** error occurs if a formula refers to itself



## Function Basics

- **Excel function**

– a predefined formula that performs a calculation

Category	Description
Compatibility	Contains functions compatible with Excel 2007 and earlier.
Cube	Returns values based on data in a cube, such as validating membership or returning a member's ranking.
Database	Analyzes records stored in a database format in Excel and returns key values, such as the number of records or averages value in a field.
Date & Time	Provides methods for manipulating date and time values.

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## Function Basics (continued)

Category	Description
Engineering	Calculates values commonly used by engineers, such as conversions.
Financial	Performs financial calculations, such as payments, rates and present/future values.
Information	Provides information about the contents of a cell, typically displaying TRUE if the cell contains a particular data type, such as a value.
Logical	Performs logical tests and returns the value of the tests. Includes logical operators such as AND, OR, and NOT.
Lookup & Reference	Looks up values, creates links to cells, or provides references to cells in a worksheet.
Math & Trig	Performs standard math and trigonometry calculations.
Statistical	Performs statistical calculations, such as averages or standard deviation.
Text	Manipulates text strings, by combining words or converting cases.

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## Function Terminology

- **Syntax**
  - Set of rules that govern correct formation of a function
- **Argument**
  - an input, such as a cell or range
- A function begins with the equal sign (=)
  - followed by the function name and
  - arguments in parentheses

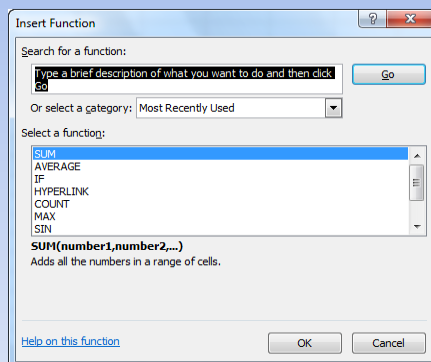
Example: =SUM(A1:A3)

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## Insert Function Dialog Box

- Use the **Insert Function** dialog box to search for a function or select one from a list



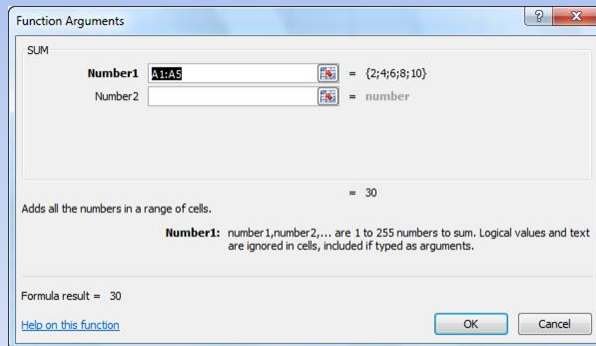
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## Function Arguments Dialog Box

- The **Function Arguments** dialog box offers help on each argument

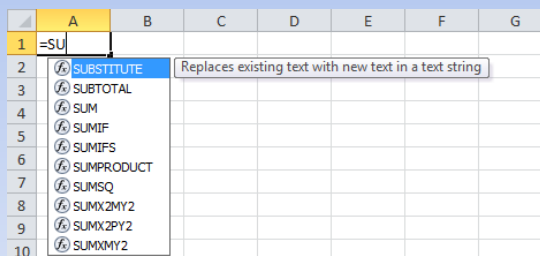


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## Inserting a Function

- When a function is typed, **Formula AutoComplete** displays a list of functions matching the partial entry



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## Inserting a Function

- **Function ScreenTip**

– a small pop-up description that displays the function arguments

	A	B	C	D	E	F	G
1	=SUM(						
2	SUM(number1, [number2], ...)						
3							

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## Totaling Values with SUM

- The SUM function returns the mathematical sum of some number of cells or ranges; for example:

=SUM(A1:A3)

=SUM(A1,B3,C5)

=SUM(A1:B3,C5:E8)

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## Basic Statistical Functions

- Common statistical functions include:
  - AVERAGE            arithmetic mean
  - MEDIAN            midpoint value
  - MIN                minimum value
  - MAX                maximum value
  - COUNT             number of values in range
  - COUNTA            number of nonempty cells
  - COUNTBLANK      number of empty cells

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## Basic Statistical Functions

The screenshot shows an Excel spreadsheet with the following data:

1	A	B	C	D	E	F
	<b>Scores</b>		<b>Measure</b>	<b>Statistic</b>	<b>Formula</b>	
2	98		Total of All Scores	898	=SUM(A2:A14)	
3	94		Average Score	81.63636	=AVERAGE(A2:A14)	
4	92		Median Score	86	=MEDIAN(A2:A14)	
5	92		Low Score	50	=MIN(A2:A14)	
6	N/A		High Score	98	=MAX(A2:A14)	
7	90		No. of Numeric Cells	11	=COUNT(A2:A14)	
8	86		No. of Empty Cells	1	=COUNTBLANK(A2:A14)	
9			No. of Non-Empty Cells	12	=COUNTA(A2:A14)	
10	84					
11	82					
12	80					
13	50					
14	50					
15						

The spreadsheet interface shows the status bar at the bottom with the following information: Average: 81.63636364, Count: 12, Sum: 898, 100% zoom.

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## Other Math & Trig Functions

Function Syntax	Description
=ABS(number)	Displays the positive value of a number.
=FREQUENCY(data_array, bins_array)	Counts how often values appear in a given range.
=INT(number)	Rounds a value down to the nearest whole number.
=MODE.SNGL(num1, [num2],...)	Displays the most frequently occurring value in a list.
=PI()	Returns the value of pi accurate to 15 digits.
=PRODUCT(num1, [num2],...)	Multiplies all values within the argument list.
=RANDBETWEEN(bottom, top)	Generates a random number between two values.

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## Other Math & Trig Functions

Function Syntax	Description
=RANK.AVG(number, ref,[order])	Identifies a value's rank within a list; returns average rank for identical values.
=RANK.EQ(number, ref,[order])	Identifies a value's rank within a list; the top rank is identified for identical values.
=ROUND(number, num_digits)	Rounds a value to a specific number of digits.
=SUMPRODUCT(array1, [array2],...)	Finds the result of multiplying values in one range by related values in another column and adding products.
=TRIMMEAN(array, percent)	Returns the average of the internal values in a range by excluding a specified percentage at the upper and lower ends.
=TRUNC(number, num_digits)	Returns the integer equivalent of a number by truncating the fractional part.

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## Date Functions

- Since dates are numeric, calculations can be performed, such as subtraction
- **TODAY** function displays the current date
  - Format: =today()
- **NOW** function displays the current date and time
  - =now()

## Making Decisions with the IF Function

- =IF(logical\_test, value\_if\_true,value\_if\_false)
- The IF function has three arguments:
  - A logical test or condition that is true or false
  - The resulting value if the condition is true
  - The resulting value if the condition is false

## Using the IF Function

	A	B	C
1	<b>Input Values</b>		
2	\$1,000		
3	\$2,000		
4	10%		
5	5%		
6	\$250		
7			
8			
9	<b>IF Function</b>	<b>Evaluation</b>	<b>Result</b>
10	=IF(A2=A3,A4,A5)	1000 is equal to 2000: FALSE	5%
11	=IF(A2<A3,A4,A5)	1000 is less than 2000: TRUE	10%
12	=IF(A2<A3,A5*A2,MAX(A3*A4,A6))	1000 is less than 2000: TRUE	\$50
13	=IF(A2<>A3,"Not Equal","Equal")	1000 and 2000 are not equal: TRUE	Not Equal
14	=IF(A2*A4=A3*A5,A6,0)	100 (A2*A4) is equal to 100 (A3*A5): TRUE	\$250

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## Designing the Logical Test

- The **logical test** is built from the logical operators

Operator	Description
=	Equal to
<>	Not equal to
<	Less than
>	Greater than
<=	Less than or equal to
>=	Greater than or equal to

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## Using Functions as Arguments

- A **nested function** occurs when one function is embedded as an argument to another function; for example:

=IF(A1<A2,MIN(B1:B5),MAX(B1:B5))

- Compute the MIN function if A1 is less than A2
- Compute the MAX function if A1 is not less than A2

## Using Lookup Functions

- **Lookup functions** are used to look up values in a table to perform calculations or display results
  - For example, a teacher may want to look up an average in order to assign a grade

Range	Grade
90-100	A
80-89	B
70-79	C
60-69	D
Below 60	F

## Creating a Lookup Table

- When searching a range, the **breakpoint** is the lowest value
- A **lookup table** typically lists breakpoints in one column and return values in a second column

Range	Grade
0	F
60	D
70	C
80	B
90	A

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## VLOOKUP Function

- **VLOOKUP** function
  - searches a lookup table for a value and returns the result from the related column
- VLOOKUP has three required arguments:
  - Lookup value
  - Table array (range of lookup table)
  - Column index of return value

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## Using the VLOOKUP Function

F3		fx =VLOOKUP(E3,\$A\$3:\$B\$7,2)					
	A	B	C	D	E	F	G
1	Grading Scale			Partial Gradebook			
2	Breakpoint	Grade		Names	Final Score	Letter Grade	
3	0	F		Abbott	85	B	
4	60	D		Carter	69	D	
5	70	C		Hon	90	A	
6	80	B		Jackson	74	C	
7	90	A		Miller	80	B	
8				Nelsen	78	C	

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## HLOOKUP Function

- The **HLOOKUP** function is used when the breakpoints and return data are placed in rows
- The third argument now lists the row index

0	60	70	80	90
F	D	C	B	A

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## Calculating Payments with the PMT Function

- **PMT** financial function
  - calculates the periodic payment for a loan with a fixed interest rate and term length
- PMT has three required arguments:
  - Interest rate
  - Number of periods
  - Present value (amount of loan)

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## Using the PMT Function

The screenshot shows an Excel spreadsheet titled "Denver Mortgage Company". The input area is as follows:

Input Area		Years	Rate
Today's Date:	1/2/2012	15	4.250%
# Pmts Per Year:	12	25	4.625%
PMI Rate:	0.38%	30	4.750%
Down Pmt Rate:	20.0%		

The main data table is as follows:

Loan #	House Cost	Payment	Amount Financed	% Down	Years	APR	Monthly Payment	Monthly PMI
452786	\$ 400,000	\$80,000	\$320,000	20.0%	25	4.625%	\$1,801.44	
453000	\$ 350,000	\$60,000	\$290,000	17.1%	30	4.750%	\$1,512.78	
453025	\$ 175,500	\$30,000	\$145,500	17.1%	25	4.625%	\$819.09	
452600	\$ 265,950	\$58,000	\$207,950	21.8%	15	4.250%	\$1,564.36	
452638	\$ 329,750	\$65,000	\$264,750	19.7%	30	4.750%	\$1,381.06	

## Range Names

- **Range name**
  - a word or phrase used to identify a cell or cell range
- Range names make formulas easier to read

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## Range Name Rules

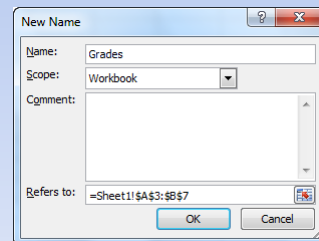
- Range names use the following rules:
  - 1 to 255 characters
  - Begin with a letter or underscore (\_)
  - Contain letters, digits, period, underscore
- Valid names include Rate, Tax\_Rate, Rate\_2012

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## Creating a Range Name

- Excel offers a variety of methods to enter a range name after selecting the cells:
  - Type the range name in the **Name Box** area
  - Enter the name using **New Name** dialog box
    - By using formula bar

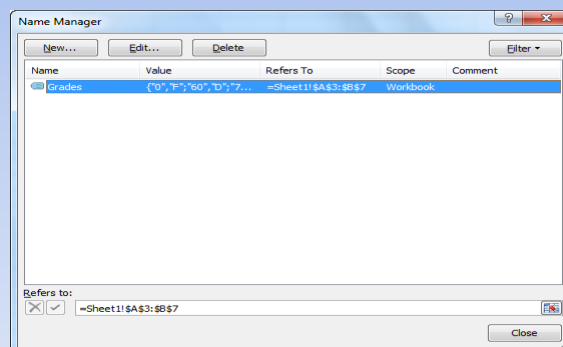


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## Maintaining Range Names

- Use the **Name Manager** dialog box to edit or delete a range name



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## Summary

- In this chapter, you have learned to write formulas using relative, absolute, and mixed cell references.
- You have learned about statistical and date functions, such as SUM, AVERAGE, and TODAY.
- You have explored the IF, VLOOKUP, and PMT functions.
- You learned to create and use range names.

## Today's work

- 4 exercises (Chapter 6) + 2 project (Chapter 6)
- Start it now and do in-class as you can
- All remaining work will be homework
- Try to finish before next class

## Best way to work

- MyITLab exercises
  - Refer the textbook
- Book provides more details of the exercises
  - Read book and
  - Do the work on MyITLab

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## MyITLab

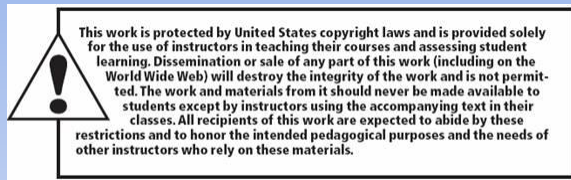
- Reminder (Again)
- Compulsory for class exercises and exams
- Computer Application course
  - Needs practice
- 50% marks for “on Computer” exams

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# Questions



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