

Excel Introduction

UBCO Master of Data Science – DATA 530



Learning Objectives

- Explain what a spreadsheet is.
- Explain how cells are addressed in a spreadsheet.
- List some of the ways to select cells in a spreadsheet.
- Define and explain: formula, function, argument, concatenation
- Use these functions: concatenate, lookup, index
- Explain the difference between an absolute and relative address.
- Explain how an aggregate function works. List some examples.
- Evaluate and create conditions. Use IF() to make decisions.
- Explain how to use conditional formatting.
- Be able to apply date and type formats.

Why Spreadsheets and Microsoft Excel?

Spreadsheets are the most common, general-purpose software for data analysis and reporting.

Microsoft Excel is the most popular spreadsheet program with hundreds of millions of installations.

- The spreadsheet concepts translate to other products.

Excel and spreadsheets are not always the best tool for data analysis, but they are great for quick analysis, reporting, and sharing.

Spreadsheet Overview

A **spreadsheet** organizes information into a two-dimensional array of cells (a **table**).

A **cell** has two components:

- an address - specified given a column letter and row number
- a location - that can store a number, text, or formula

The power of a spreadsheet is that we can write simple formulas (commands) to perform calculations and immediately see the results of those calculations.

Spreadsheets are very common in business and reporting applications.

Spreadsheet Addressing

A **cell** is identified by a column letter and row number.

The screenshot shows an Excel spreadsheet titled 'sales.xlsx'. The formula bar displays the formula `=SUM(G2:G12)` for cell G13. The spreadsheet data is as follows:

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Category	Product	Month	Volume	Price	Cost	Revenue						
2	Food	Chocolate	Jan	20	\$ 2.00	\$ 1.00	\$ 40.00						
3	Clothing	Jacket	Jan	15	\$ 50.00	\$ 35.00	\$ 750.00						
4	Toys	Ball	Jan	55	\$ 1.00	\$ 0.50	\$ 55.00						
5	Food	Chocolate	Feb	80	\$ 2.50	\$ 1.00	\$ 200.00						
6	Clothing	Jacket	Feb	10	\$ 50.00	\$ 35.00	\$ 500.00						
7	Toys	Ball	Feb	65	\$ 1.00	\$ 0.60	\$ 65.00						
8	Food	Chocolate	Mar	30	\$ 2.00	\$ 1.00	\$ 60.00						
9	Toys	Ball	Mar	70	\$ 1.00	\$ 0.40	\$ 70.00						
10	Toys	Bat	Mar	10	\$ 75.00	\$ 50.00	\$ 750.00						
11	Clothing	Jacket	Mar	8	\$ 50.00	\$ 30.00	\$ 400.00						
12	Food	Apples	Mar	100	\$ 3.00	\$ 2.00	\$ 300.00						
13							\$ 3,190.00						

The formula bar shows `=SUM(G2:G12)` for cell G13. The spreadsheet has columns A-M and rows 1-14. The status bar at the bottom shows 'Ready' and 'QuarterSales'.

} columns

rows

Cell G13

Spreadsheet Addressing

The rows in a spreadsheet are numbered starting from 1.

The columns are represented by letters.

- A is column 1, B is column 2, ..., Z is column 26, AA is column 27, ...

A cell is identified by putting the column letter first then the row number.

- e.g. B3 is the 2nd column and the 3rd row.

Question: What column number is AD? How about BAD?

Spreadsheet Data Entry

An entry is added to a cell by clicking on it and typing in the data.

- The data may be a number, text, date, etc. Type and *format* are auto-detected.

The screenshot shows the Microsoft Excel interface with the 'Number' dropdown menu in the ribbon highlighted by a blue circle. A blue arrow points from this dropdown to the word 'format' in blue text. The spreadsheet below shows a table with the following data:

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Category	Product	Month	Volume	Price	Cost	Revenue						
2	Food	Chocolate	Jan	20	\$ 2.00	\$ 1.00	\$ 40.00						
3	Clothing	Jacket	Jan	15	\$ 50.00	\$ 35.00	\$ 750.00						
4	Toys	Ball	Jan	55	\$ 1.00	\$ 0.50	\$ 55.00						
5	Food	Chocolate	Feb	80	\$ 2.50	\$ 1.00	\$ 200.00						
6	Clothing	Jacket	Feb	10	\$ 50.00	\$ 35.00	\$ 500.00						
7	Toys	Ball	Feb	65	\$ 1.00	\$ 0.60	\$ 65.00						
8	Food	Chocolate	Mar	30	\$ 2.00	\$ 1.00	\$ 60.00						
9	Toys	Ball	Mar	70	\$ 1.00	\$ 0.40	\$ 70.00						
10	Toys	Bat	Mar	10	\$ 75.00	\$ 50.00	\$ 750.00						
11	Clothing	Jacket	Mar	8	\$ 50.00	\$ 30.00	\$ 400.00						
12	Food	Apples	Mar	100	\$ 3.00	\$ 2.00	\$ 300.00						
13					Total:		\$ 3,190.00						

Spreadsheet Formatting

Formatting: bold, italics, underline, fonts, colors

The screenshot shows the Microsoft Excel interface with the 'Home' tab selected. The 'Font' group on the ribbon is circled in orange, and an arrow points from the text 'format shortcuts' to it. The spreadsheet below shows a table with the following data:

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Category	Product	Month	Volume	Price	Cost	Revenue						
2	Food	Chocolate	Jan	20	\$ 2.00	\$ 1.00	\$ 40.00						
3	Clothing	Jacket	Jan	15	\$ 50.00	\$ 35.00	\$ 750.00						
4	Toys	Ball	Jan	55	\$ 1.00	\$ 0.50	\$ 55.00						
5	Food	Chocolate	Feb	80	\$ 2.50	\$ 1.00	\$ 200.00						
6	Clothing	Jacket	Feb	10	\$ 50.00	\$ 35.00	\$ 500.00						
7	Toys	Ball	Feb	65	\$ 1.00	\$ 0.60	\$ 65.00						
8	Food	Chocolate	Mar	30	\$ 2.00	\$ 1.00	\$ 60.00						
9	Toys	Ball	Mar	70	\$ 1.00	\$ 0.40	\$ 70.00						
10	Toys	Bat	Mar	10	\$ 75.00	\$ 50.00	\$ 750.00						
11	Clothing	Jacket	Mar	8	\$ 50.00	\$ 30.00	\$ 400.00						
12	Food	Apples	Mar	100	\$ 3.00	\$ 2.00	\$ 300.00						
13					Total:		\$3,190.00						

Spreadsheet Selecting Cells

Multiple ways of selecting cells:

- 1) With the mouse, (left) click and drag mouse to select a rectangle region of cells.
- 2) With keyboard, hold **SHIFT** key and use arrow keys to select a rectangle region of cells.
- 3) With mouse and keyboard, while holding **CTRL** key, (left) click on individual cells to select non-contiguous cells.
- 4) Click on a row number to select a whole row.
- 5) Click on a column header to select a whole column.

Range Selecting Cells Example

sales.xlsx - Excel

File Home Insert Page Layout Formulas Data Review View Developer Team Tell me... Sign in Share

Clipboard Font Alignment Number Styles Cells Editing

A3 Clothing

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Category	Product	Month	Volume	Price	Cost	Revenue						
2	Food	Chocolate	Jan	20	\$ 2.00	\$ 1.00	\$ 40.00						
3	Clothing	Jacket	Jan	15	\$ 50.00	\$ 35.00	\$ 750.00						
4	Toys	Ball	Jan	55	\$ 1.00	\$ 0.50	\$ 55.00						
5	Food	Chocolate	Feb	80	\$ 2.50	\$ 1.00	\$ 200.00						
6	Clothing	Jacket	Feb	10	\$ 50.00	\$ 35.00	\$ 500.00						
7	Toys	Ball	Feb	65	\$ 1.00	\$ 0.60	\$ 65.00						
8	Food	Chocolate	Mar	30	\$ 2.00	\$ 1.00	\$ 60.00						
9	Toys	Ball	Mar	70	\$ 1.00	\$ 0.40	\$ 70.00						
10	Toys	Bat	Mar	10	\$ 75.00	\$ 50.00	\$ 750.00						
11	Clothing	Jacket	Mar	8	\$ 50.00	\$ 30.00	\$ 400.00						
12	Food	Apples	Mar	100	\$ 3.00	\$ 2.00	\$ 300.00						
13					Total:		\$3,190.00						

QuarterSales QuarterSalesFormat QuarterPivot ...

Ready Average: 115 Count: 28 Sum: 1840 100%

Selecting Individual Cells Example

sales.xlsx - Excel

File Home Insert Page Layout Formulas Data Review View Developer Team Tell me... Sign in Share

Clipboard Font Alignment Number Styles Cells Editing

G13 : X ✓ fx =SUM(G2,G5,G8,G10,G12

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Category	Product	Month	Volume	Price	Cost	Revenue						
2	Food	Chocolate	Jan	20	\$ 2.00	\$ 1.00	\$ 40.00						
3	Clothing	Jacket	Jan	15	\$ 50.00	\$ 35.00	\$ 750.00						
4	Toys	Ball	Jan	55	\$ 1.00	\$ 0.50	\$ 55.00						
5	Food	Chocolate	Feb	80	\$ 2.50	\$ 1.00	\$ 200.00						
6	Clothing	Jacket	Feb	10	\$ 50.00	\$ 35.00	\$ 500.00						
7	Toys	Ball	Feb	65	\$ 1.00	\$ 0.60	\$ 65.00						
8	Food	Chocolate	Mar	30	\$ 2.00	\$ 1.00	\$ 60.00						
9	Toys	Ball	Mar	70	\$ 1.00	\$ 0.40	\$ 70.00						
10	Toys	Bat	Mar	10	\$ 75.00	\$ 50.00	\$ 750.00						
11	Clothing	Jacket	Mar	8	\$ 50.00	\$ 30.00	\$ 400.00						
12	Food	Apples	Mar	100	\$ 3.00	\$ 2.00	\$ 300.00						
13				Total:			G10,G12						

QuarterSales QuarterSalesFormat QuarterPivot ... 100%

Manipulating Cells

Once you have selected one or more cells, there are several common actions you can perform:

1) DELETE

- delete the contents of all cells by pressing delete key
- delete the contents and the cell locations (then shift remaining) by selecting `Edit` menu, `Delete...` or `Delete...` from pop-up menu (brought up by right click).

2) Cut, Copy, Paste

- cut - copies selected cells to clipboard and removes from document
- copy - copies selected cells to clipboard
- paste - copies cells in clipboard to sheet starting at currently selected cell

3) Add selected cells to a formula (requires that you were previously constructing a formula before selecting the cells).

Manipulating Cells - Filling

Filling combines copy and paste.

There is a small box or tab beyond the cell's lower right corner (fill handle). Grab it with the cursor and pull to other cells.

Cut, Copy, Paste

cut,
copy,
paste

The screenshot shows the Microsoft Excel interface with the 'Home' ribbon selected. The formula bar displays '20' in cell D2. The spreadsheet contains the following data:

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Category	Product	Month	Volume	Price	Cost	Revenue						
2	Food	Chocolate	Jan	20	\$ 2.00	\$ 1.00	\$ 40.00						
3	Clothing	Jacket	Jan	15	\$ 50.00	\$ 35.00	\$ 750.00						
4	Toys	Ball	Jan	55	\$ 1.00	\$ 0.50	\$ 55.00						
5	Food	Chocolate	Feb	80	\$ 2.50	\$ 1.00	\$ 200.00						
6	Clothing	Jacket	Feb	10	\$ 50.00	\$ 35.00	\$ 500.00						
7	Toys	Ball	Feb	65	\$ 1.00	\$ 0.60	\$ 65.00						
8	Food	Chocolate	Mar	30	\$ 2.00	\$ 1.00	\$ 60.00						
9	Toys	Ball	Mar	70	\$ 1.00	\$ 0.40	\$ 70.00						
10	Toys	Bat	Mar	10	\$ 75.00	\$ 50.00	\$ 750.00						
11	Clothing	Jacket	Mar	8	\$ 50.00	\$ 30.00	\$ 400.00						
12	Food	Apples	Mar	100	\$ 3.00	\$ 2.00	\$ 300.00						
13					Total:		\$3,190.00						

The status bar at the bottom shows 'Ready' and 'QuarterSales' is selected in the workbook tabs.

Hiding Columns and Rows

Right-clicking on the column or row header and selecting **Hide**.

- The column/row still exists but will not be displayed or printed unless unhidden.

The screenshot shows the Excel interface with a spreadsheet titled 'sales.xlsx'. The active cell is F1, containing the text 'Cost'. A right-click context menu is open over the column F header. The menu options are: Cut, Copy, Paste Options, Paste Special..., Insert, Delete, Clear Contents, Format Cells..., Column Width..., Hide (highlighted), and Unhide. The spreadsheet data includes columns for Category, Product, Month, Volume, Price, and Cost, with rows of product sales data.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Category	Product	Month	Volume	Price	Cost							
2	Food	Chocolate	Jan	20	\$ 2.00	\$ 1.4							
3	Clothing	Jacket	Jan	15	\$ 50.00	\$ 35.0							
4	Toys	Ball	Jan	55	\$ 1.00	\$ 0.5							
5	Food	Chocolate	Feb	80	\$ 2.50	\$ 1.0							
6	Clothing	Jacket	Feb	10	\$ 50.00	\$ 35.0							
7	Toys	Ball	Feb	65	\$ 1.00	\$ 0.6							
8	Food	Chocolate	Mar	30	\$ 2.00	\$ 1.0							
9	Toys	Ball	Mar	70	\$ 1.00	\$ 0.4							
10	Toys	Bat	Mar	10	\$ 75.00	\$ 50.0							
11	Clothing	Jacket	Mar	8	\$ 50.00	\$ 30.0							
12	Food	Apples	Mar	100	\$ 3.00	\$ 2.0							
13													
14													

Selecting Cells Question

Question: Which method allows you to select non-contiguous cells in a spreadsheet?

- A)** hold **SHIFT** key and use arrow keys
- B)** With the mouse left click on a cell and drag mouse
- C)** hold **CTRL** key and use arrow keys
- D)** hold **CTRL** key and left click on cells

Entering Formulas

A **formula** is any expression that begins with an equal sign ("=").

- The equal sign means that a calculation must be done to compute the cell value.

The screenshot shows the Excel interface with the formula bar active. The formula `=SUM(G2:G12)` is entered in cell G13. The formula bar has a blue circle around the text `=SUM(G2:G12)` and a blue arrow pointing to it from the word "formula". The spreadsheet data is as follows:

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Category	Product	Month	Volume	Price	Cost	Revenue						
2	Food	Chocolate	Jan	20	\$ 2.00	\$ 1.00	\$ 40.00						
3	Clothing	Jacket	Jan	15	\$ 50.00	\$ 35.00	\$ 750.00						
4	Toys	Ball	Jan	55	\$ 1.00	\$ 0.50	\$ 55.00						
5	Food	Chocolate	Feb	80	\$ 2.50	\$ 1.00	\$ 200.00						
6	Clothing	Jacket	Feb	10	\$ 50.00	\$ 35.00	\$ 500.00						
7	Toys	Ball	Feb	65	\$ 1.00	\$ 0.60	\$ 65.00						
8	Food	Chocolate	Mar	30	\$ 2.00	\$ 1.00	\$ 60.00						
9	Toys	Ball	Mar	70	\$ 1.00	\$ 0.40	\$ 70.00						
10	Toys	Bat	Mar	10	\$ 75.00	\$ 50.00	\$ 750.00						
11	Clothing	Jacket	Mar	8	\$ 50.00	\$ 30.00	\$ 400.00						
12	Food	Apples	Mar	100	\$ 3.00	\$ 2.00	\$ 300.00						
13					Total:		\$ 3,190.00						

Formula Expressions

A **formula** expression can consist of literals (numbers, text strings), operators, functions, and cell references.

Simple mathematical expressions:

- `= 1 + 5`
- `= 1.5 * 3.14 + 42`

Common functions:

- `= ROUND (PI () , 2)` // Result is 3.14
- `= CONCATENATE ("Hello", " World")` // Hello World
- Other common functions for trigonometry, dates, and financial.

Formula Expressions

The power of formulas comes from using cell references (similar to variable names in programming).

Cell reference examples:

- `= A1 + A2`
- `= B1 + A3 - A4`

Formulas Question

Question: A cell contains the following: $=2+4*3$ What is the value of the cell?

A) 14

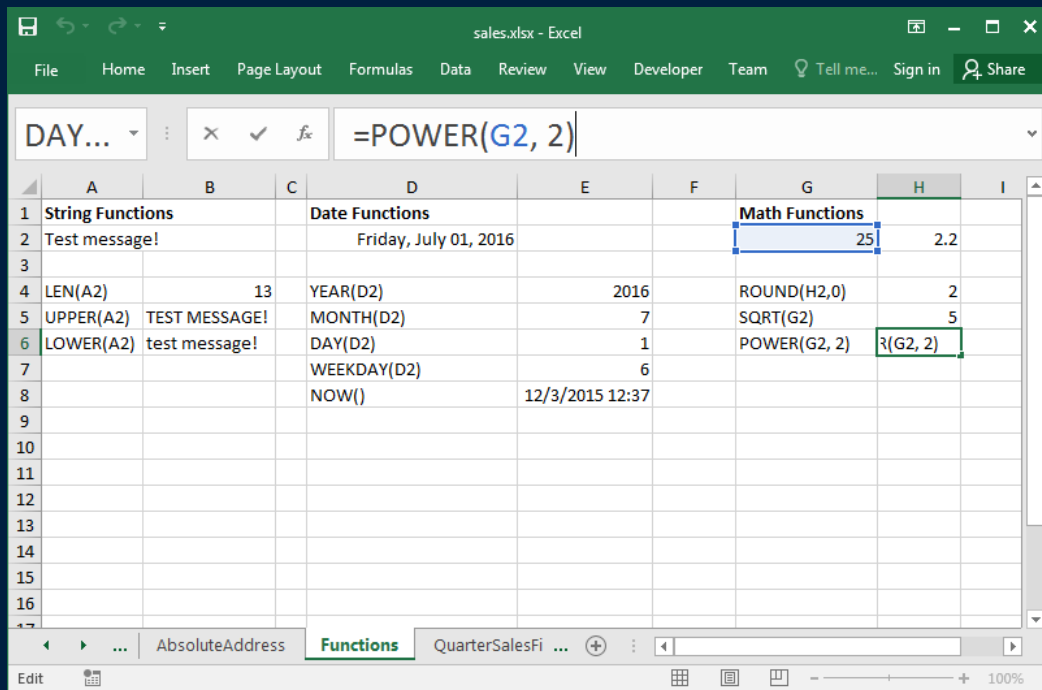
B) 18

C) $=2+4*3$

Using Excel Functions

Excel has a large number of built-in functions to use.

A **function** takes arguments as input and produces an output.



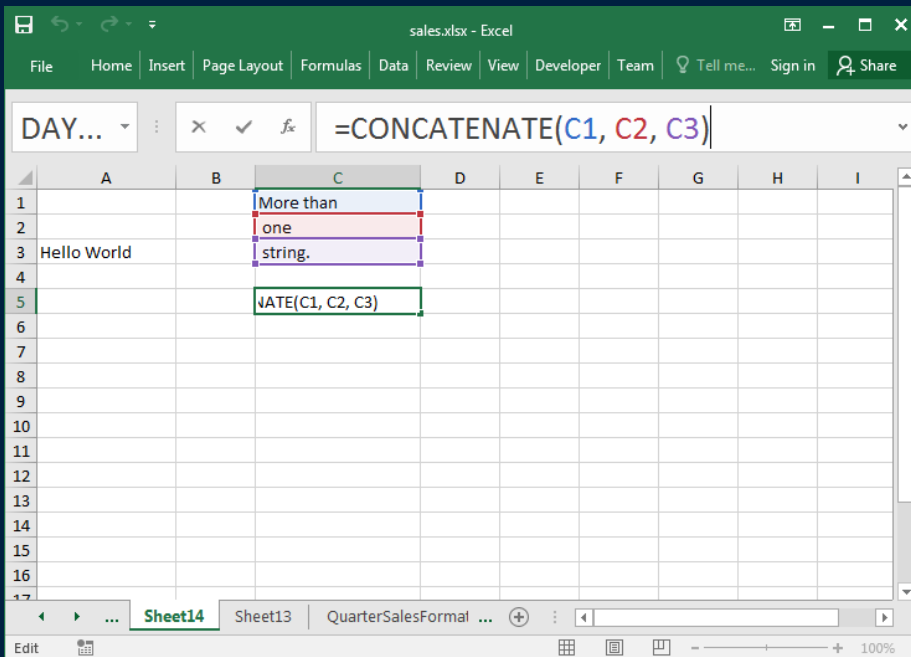
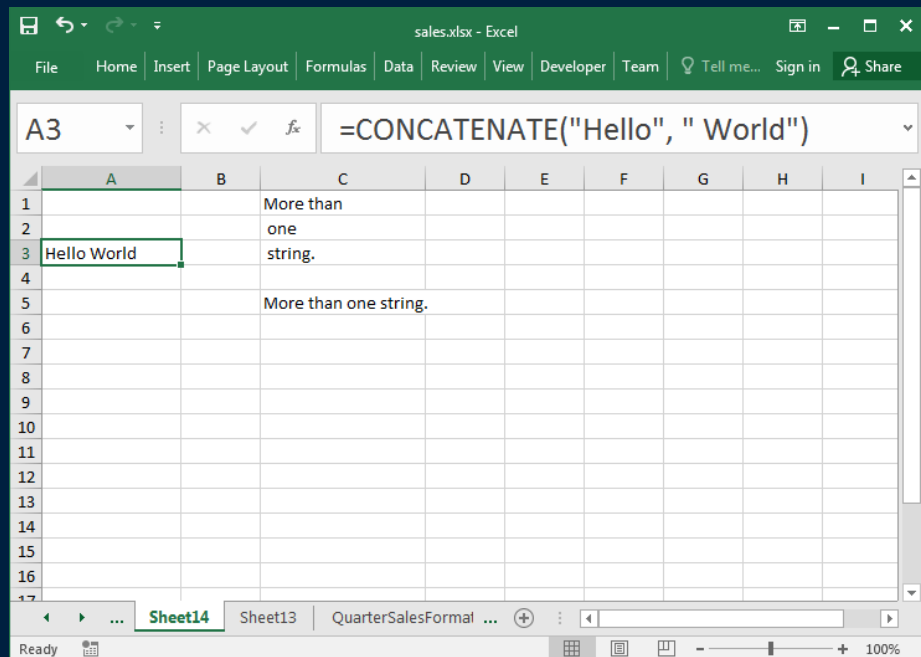
The screenshot shows the Excel interface with the following data:

	A	B	C	D	E	F	G	H	I
1	String Functions		Date Functions				Math Functions		
2	Test message!		Friday, July 01, 2016				25	2.2	
3									
4	LEN(A2)	13	YEAR(D2)	2016			ROUND(H2,0)	2	
5	UPPER(A2)	TEST MESSAGE!	MONTH(D2)	7			SQRT(G2)	5	
6	LOWER(A2)	test message!	DAY(D2)	1			POWER(G2, 2)	3(G2, 2)	
7			WEEKDAY(D2)	6					
8			NOW()	12/3/2015 12:37					
9									
10									
11									
12									
13									
14									
15									
16									

The formula bar at the top shows the formula: `=POWER(G2, 2)`. The status bar at the bottom indicates the current cell is A2.

Concatenation

String concatenation is when two or more strings are combined by appending them in order. Function in Excel is `CONCATENATE()` or `&`.



LOOKUP Function

The LOOKUP function searches for a value in a column.

- VLOOKUP searches a column in a table ; HLOOKUP searches a row in a table.

The screenshot shows an Excel spreadsheet with the following data:

Product Id	Product Name	Product Price
1	Apple	\$ 3.99
2	Banana	\$ 2.99
3	Lettuce	\$ 1.99
4	Squash	\$ 6.99
5	Pumpkin	\$ 5.99

The formula bar shows the formula: `=LOOKUP(F2, A2:A6, C2:C6)`. A tooltip explains the function syntax: `LOOKUP(lookup_value, lookup_vector, [result_vector])`. The spreadsheet also shows a table with the following data:

Product Id	Price (LOOKUP)	Price (VLOOKUP)
2	\$ 2.99	

INDEX Function

INDEX () returns the value in the array of cells at the given index.

The screenshot shows the Microsoft Excel interface with the formula bar displaying `=INDEX(B2:B6,F2+1)`. The worksheet contains a table of product data and a lookup table.

Product Id	Product Name	Product Price
1	Apple	\$ 3.99
2	Banana	\$ 2.99
3	Lettuce	\$ 1.99
4	Squash	\$ 6.99
5	Pumpkin	\$ 5.99

Product Id	Price (LOOKUP)	Price (VLOOKUP)	Product (INDEX)
2	\$ 2.99	\$ 2.99	

The formula bar shows the formula `=INDEX(B2:B6,F2+1)`, which uses the INDEX function to retrieve the value from the array B2:B6 at the row number specified by F2+1 (which is 3).

Formulas Question

Question: A cell contains the following: **'ABC'+ 'DEF'**. What is the value of the cell?

A) error

B) ABCDEF

C) 'ABC'+ 'DEF'

Formulas Question

Question: How many of the following statements are **TRUE**?

- 1) CONCATENATE function can take 3 arguments.
- 2) There is an Excel function that has 0 arguments.
- 3) =INDEX ({ 1 , 3 , 5 } , 2) returns 5.
- 4) =LOOKUP (5 , { 1 , 3 , 5 } , { "a" , "b" , "c" }) returns "c".

A) 0 **B) 1** **C) 2** **D) 3** **E) 4**

Try it: Entering Formulas

Question: Add a column for expenses and profit as below:

sales.xlsx - Excel

File Home Insert Page Layout Formulas Data Review View Developer Team Tell me... Sign in Share

Clipboard Font Alignment Number Styles Cells Editing

H13

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Category	Product	Month	Volume	Price	Cost	Revenue	Expenses	Profit				
2	Food	Chocolate	Jan	20	\$ 2.00	\$ 1.00	\$ 40.00	\$ 20.00	\$ 20.00				
3	Clothing	Jacket	Jan	15	\$ 50.00	\$ 35.00	\$ 750.00	\$ 525.00	\$ 225.00				
4	Toys	Ball	Jan	55	\$ 1.00	\$ 0.50	\$ 55.00	\$ 27.50	\$ 27.50				
5	Food	Chocolate	Feb	80	\$ 2.50	\$ 1.00	\$ 200.00	\$ 80.00	\$ 120.00				
6	Clothing	Jacket	Feb	10	\$ 50.00	\$ 35.00	\$ 500.00	\$ 350.00	\$ 150.00				
7	Toys	Ball	Feb	65	\$ 1.00	\$ 0.60	\$ 65.00	\$ 39.00	\$ 26.00				
8	Food	Chocolate	Mar	30	\$ 2.00	\$ 1.00	\$ 60.00	\$ 30.00	\$ 30.00				
9	Toys	Ball	Mar	70	\$ 1.00	\$ 0.40	\$ 70.00	\$ 28.00	\$ 42.00				
10	Toys	Bat	Mar	10	\$ 75.00	\$ 50.00	\$ 750.00	\$ 500.00	\$ 250.00				
11	Clothing	Jacket	Mar	8	\$ 50.00	\$ 30.00	\$ 400.00	\$ 240.00	\$ 160.00				
12	Food	Apples	Mar	100	\$ 3.00	\$ 2.00	\$ 300.00	\$ 200.00	\$ 100.00				
13					Total:		\$ 3,190.00						
14													

AbsoluteAddress QuarterSalesTryIt1 QuarterSalesT ...

Ready 100%



Advanced Spreadsheet Addressing

The dollar sign "\$" is a symbol that indicates an *absolute address*.

- By default, addresses are "relative" in the sense that if they are in a formula that is copied to another cell, they will be changed relative to where they were copied from their origin.

Example:

- Cell A1 has the formula `=A2+B1`
- Copy contents of cell A1 to cell C4.
- Formula changes to `=C5+D4` because moved down three rows and over two columns.
- If cell A1 had the formula `=A2+B1`, then the same formula would be in cell C4.
- Question: What if formula was `=$A2+B$1`?

Formulas and References Question

Question: Cell **A1** contains the following: **=\$B2+D\$4**. What is the formula if the cell is copied to cell **D3**?

A) error

B) =\$B2+D\$4

C) =\$B4+F\$4

D) =\$B4+G\$4



Aggregate Functions

An **aggregate function** computes a summary function over a range of cells. The values can either be data values or cell locations.

Common functions are:

- `MIN(<value list>)` - returns minimum value in list
- `MAX(<value list>)` - returns maximum value in list
- `SUM(<value list>)` - returns sum of all values in list
- `AVERAGE(<value list>)` - returns average of values in list
- `COUNT(<value list>)` - returns count of values in list
- `MEDIAN(<value list>)` - returns median value of list

If specifying a cell rectangle, give the upper left and lower right corners, separated by a colon.

- e.g. `=AVERAGE(A3:E6)` - rectangle of 4 rows and 5 columns

Aggregate Functions Example

sales.xlsx - Excel

File Home Insert Page Layout Formulas Data Review View Developer Team Tell me... Sign in Share

Clipboard Font Alignment Number Styles Cells Editing

D2 \times \checkmark f_x =max(D2:D12

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Category	Product	Month	Volume	Price	Cost	Revenue	Expenses	Profit				
2	Food	Chocolate	Jan	20	\$ 2.00	\$ 1.00	\$ 40.00	\$ 20.00	\$ 20.00				
3	Clothing	Jacket	Jan	15	\$ 50.00	\$ 35.00	\$ 750.00	\$ 525.00	\$ 225.00				
4	Toys	Ball	Jan	55	\$ 1.00	\$ 0.50	\$ 55.00	\$ 27.50	\$ 27.50				
5	Food	Chocolate	Feb	80	\$ 2.50	\$ 1.00	\$ 200.00	\$ 80.00	\$ 120.00				
6	Clothing	Jacket	Feb	10	\$ 50.00	\$ 35.00	\$ 500.00	\$ 350.00	\$ 150.00				
7	Toys	Ball	Feb	65	\$ 1.00	\$ 0.60	\$ 65.00	\$ 39.00	\$ 26.00				
8	Food	Chocolate	Mar	30	\$ 2.00	\$ 1.00	\$ 60.00	\$ 30.00	\$ 30.00				
9	Toys	Ball	Mar	70	\$ 1.00	\$ 0.40	\$ 70.00	\$ 28.00	\$ 42.00				
10	Toys	Bat	Mar	10	\$ 75.00	\$ 50.00	\$ 750.00	\$ 500.00	\$ 250.00				
11	Clothing	Jacket	Mar	8	\$ 50.00	\$ 30.00	\$ 400.00	\$ 240.00	\$ 160.00				
12	Food	Apples	Mar	100	\$ 3.00	\$ 2.00	\$ 300.00	\$ 200.00	\$ 100.00				
13				=max(D2:D12	tal:		\$3,190.00						
14				MAX(number1, [number2], ...)									

QuarterSales QuarterSalesFormat QuarterPivot ... 100%

Try it: Aggregate Functions

Question: Create aggregate functions to match below:

sales.xlsx - Excel

File Home Insert Page Layout Formulas Data Review View Developer Team Tell me... Sign in Share

Clipboard Font Alignment Number Styles Cells Editing

H13

	A	B	C	D	E	F	G	H	I	J	K	L	M
	Category	Product	Month	Volume	Price	Cost	Revenue						
2	Food	Chocolate	Jan	20	\$ 2.00	\$ 1.00	\$ 40.00						
3	Clothing	Jacket	Jan	15	\$ 50.00	\$ 35.00	\$ 750.00						
4	Toys	Ball	Jan	55	\$ 1.00	\$ 0.50	\$ 55.00						
5	Food	Chocolate	Feb	80	\$ 2.50	\$ 1.00	\$ 200.00						
6	Clothing	Jacket	Feb	10	\$ 50.00	\$ 35.00	\$ 500.00						
7	Toys	Ball	Feb	65	\$ 1.00	\$ 0.60	\$ 65.00						
8	Food	Chocolate	Mar	30	\$ 2.00	\$ 1.00	\$ 60.00						
9	Toys	Ball	Mar	70	\$ 1.00	\$ 0.40	\$ 70.00						
10	Toys	Bat	Mar	10	\$ 75.00	\$ 50.00	\$ 750.00						
11	Clothing	Jacket	Mar	8	\$ 50.00	\$ 30.00	\$ 400.00						
12	Food	Apples	Mar	100	\$ 3.00	\$ 2.00	\$ 300.00						
13				42	\$ 75.00	\$ 0.40	\$ 3,190.00						
14													

QuarterSalesTryIt1 QuarterSalesTryIt2

Ready

Aggregate Functions Question

Question: Assume the cells in the range A1 : C4 each contain a number that is equal to their row number (e.g. B3 contains 3). How many of the following statements are **TRUE**?

- 1) The number of cells in the range is 12.
- 2) The value of SUM (A1 : C4) is 20.
- 3) The value of COUNTIF (A1 : B4, ">2") is 4.
- 4) AVERAGE (A1 : C4) > MAX (C2 : C3)

A) 0
B) 1
C) 2
D) 3
E) 4

Aggregate Functions Question

Question: Assume the three cells in the range A1 : C1 contain numbers. Which of these formula output results is **ALWAYS** the largest?

A) MAX (A1 : C1)

B) MIN (A1 : C1)

C) COUNT (A1 : C1)

D) SUM (A1 : C1)

E) none of the above are always guaranteed to be the largest

Other Formatting: Column Width

The screenshot shows the Microsoft Excel interface with the 'Format' menu open. The spreadsheet contains data for 'QuarterSales' with columns for Category, Product, Month, Volume, Price, Cost, and Revenue. The 'Format' menu is open, showing options for Cell Size, Visibility, and Protection. The 'Column Width...' option is highlighted.

Category	Product	Month	Volume	Price	Cost	Revenue
Food	Chocolate	Jan	20	\$ 2.00	\$ 1.00	\$ 40.00
Clothing	Jacket	Jan	15	\$ 50.00	\$ 35.00	\$ 750.00
Toys	Ball	Jan	55	\$ 1.00	\$ 0.50	\$ 55.00
Food	Chocolate	Feb	80	\$ 2.50	\$ 1.00	\$ 200.00
Clothing	Jacket	Feb	10	\$ 50.00	\$ 35.00	\$ 500.00
Toys	Ball	Feb	65	\$ 1.00	\$ 0.60	\$ 65.00
Food	Chocolate	Mar	30	\$ 2.00	\$ 1.00	\$ 60.00
Toys	Ball	Mar	70	\$ 1.00	\$ 0.40	\$ 70.00
Toys	Bat	Mar	10	\$ 75.00	\$ 50.00	\$ 750.00
Clothing	Jacket	Mar	8	\$ 50.00	\$ 30.00	\$ 400.00
Food	Apples	Mar	100	\$ 3.00	\$ 2.00	\$ 300.00
Total:						\$ 3,190.00

Resizing columns/rows:

Auto-resize by double clicking on border between columns or using the Format option.

Drag row/column border for manual resize.

Conditions and Decisions

A **condition** is an expression that is either TRUE or FALSE.

Conditions are used to make decisions and perform different actions depending on the condition value.

Excel condition and decision functions:

- FALSE () – **returns** FALSE
- TRUE () – **returns** TRUE
- AND (cond1, cond2) – **returns** TRUE if **both** cond1 **and** cond2 **are true**
- OR (cond1, cond2) – **returns** TRUE if **either or both of** cond1 **and** cond2 **are true**
- NOT (cond) – **returns** TRUE if cond **is** FALSE

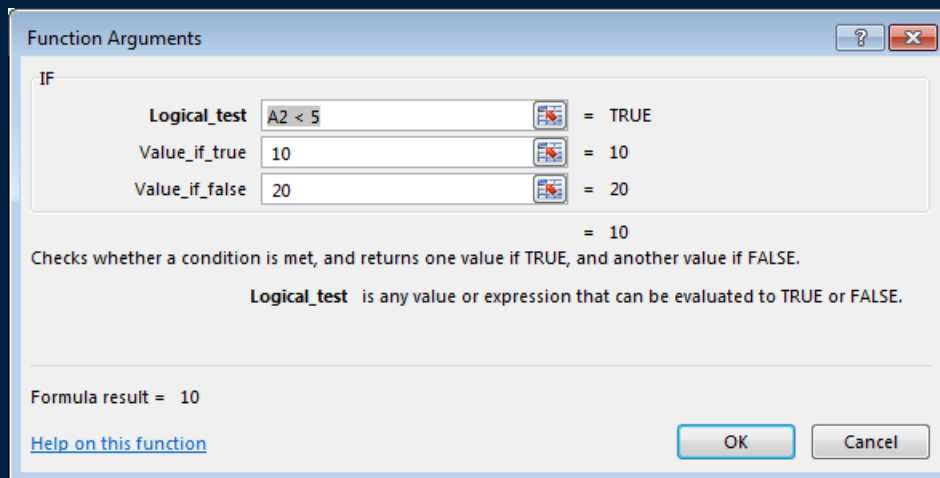
Decisions using IF ()

The IF () function is used to make a decision based on a condition.

- `IF(condition, value_if_true, value_if_false)`

Example: If cell A2 is less than 5, return 10 otherwise return 20.

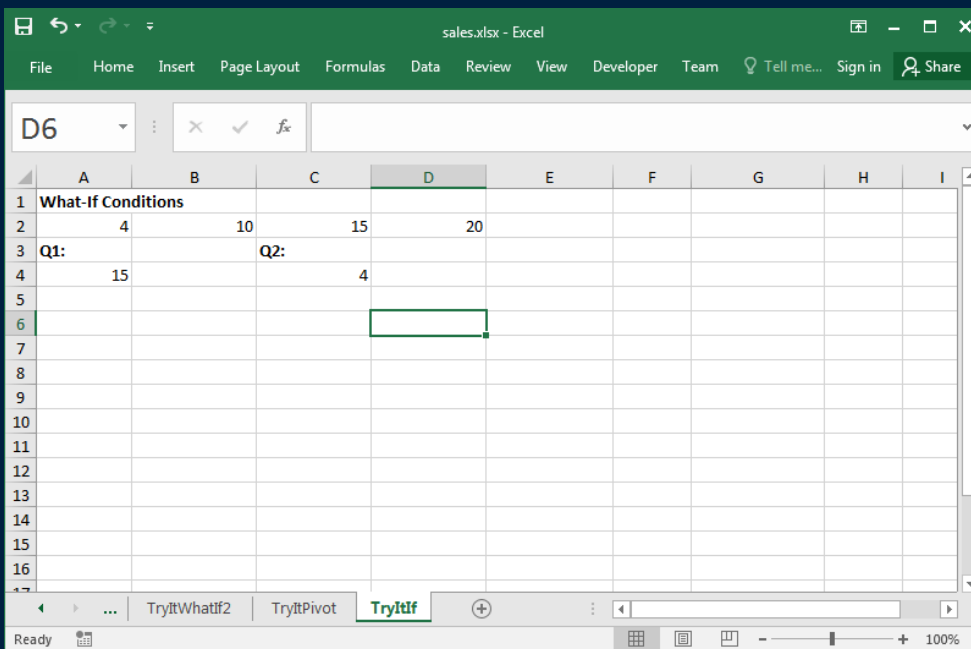
= IF (A2 < 5, 10, 20)



Try it: Conditions and IF ()

Question: Create two conditions:

- 1) If cell B2 \geq 10, then show C2, otherwise D2.
- 2) If cell B2 < 15 and C2 > 20, return B2*C2, otherwise if D2 < 10, return 1, else 4.



Decisions using IF () Question

Question: How many of these statements are **TRUE**? **A1=40 , A2=10**

1) =AND (FALSE () , TRUE ())

2) =OR (FALSE () , NOT (TRUE ()))

3) =IF (A1=40 , 5 , 10) returns 10.

4) =IF (OR (A1=40 , A2>10) , 1 , 2) returns 2.

5) =IF (A2=10 , IF (A1=40 , FALSE ()) , TRUE ())

A) 0

B) 1

C) 2

D) 3

E) 4

Conditional Formatting

Conditional formatting allows you to change the cell format based on data values. This is accessible under **Styles**.

- Other options: data bars, color scales

The screenshot displays an Excel spreadsheet titled 'sales.xlsx' with a table of sales data. The table has columns for Category, Product, Month, Volume, Price, Cost, and Revenue. The Revenue column is formatted with conditional formatting rules. The Conditional Formatting Rules Manager dialog is open, showing the following rules:

Rule (applied in order shown)	Format	Applies to	Stop If True
Cell Value > 350	AaBbCcYyZ	=G\$2:\$G\$12	<input type="checkbox"/>
Cell Value < 75	AaBbCcYyZ	=G\$2:\$G\$12	<input type="checkbox"/>

The data in the table is as follows:

	A	B	C	D	E	F	G
1	Category	Product	Month	Volume	Price	Cost	Revenue
2	Food	Chocolate	Jan	20	\$ 2.00	\$ 1.00	\$ 40.00
3	Clothing	Jacket	Jan	15	\$50.00	\$35.00	\$ 750.00
4	Toys	Ball	Jan	55	\$ 1.00	\$ 0.50	\$ 55.00
5	Food	Chocolate	Feb	80	\$ 2.50	\$ 1.00	\$ 200.00
6	Clothing	Jacket	Feb	10	\$50.00	\$35.00	\$ 500.00
7	Toys	Ball	Feb	65	\$ 1.00	\$ 0.60	\$ 65.00
8	Food	Chocolate	Mar	30	\$ 2.00	\$ 1.00	\$ 60.00
9	Toys	Ball	Mar	70	\$ 1.00	\$ 0.40	\$ 70.00
10	Toys	Bat	Mar	10	\$75.00	\$50.00	\$ 750.00
11	Clothing	Jacket	Mar	8	\$50.00	\$30.00	\$ 400.00
12	Food	Apples	Mar	100	\$ 3.00	\$ 2.00	\$ 300.00
13				Total:			\$3,190.00

Conditional Formatting Result

The format painter button allows you to copy formatting to many cells. Select the cell, click paint button, then highlight cells to have identical formatting.

format
painter
button

Format Painter

Like the look of a particular selection? You can apply that look to other content in the document.

To get started:

1. Select content with the formatting you like
2. Click Format Painter
3. Select something else to automatically apply the formatting

FYI: To apply the formatting in multiple places, double-click Format Painter.

[Tell me more](#)

Volume	Price	Cost	Revenue
20	\$ 2.00	\$ 1.00	\$ 40.00
15	\$ 50.00	\$ 35.00	\$ 750.00
55	\$ 1.00	\$ 0.50	\$ 55.00
80	\$ 2.50	\$ 1.00	\$ 200.00
10	\$ 50.00	\$ 35.00	\$ 500.00
65	\$ 1.00	\$ 0.60	\$ 65.00
30	\$ 2.00	\$ 1.00	\$ 60.00
70	\$ 1.00	\$ 0.40	\$ 70.00
10	\$ 75.00	\$ 50.00	\$ 750.00
8	\$ 50.00	\$ 30.00	\$ 400.00
100	\$ 3.00	\$ 2.00	\$ 300.00
Total:			\$ 3,190.00

Try it: Conditional Formatting

Question: Format rows so: 1) bold/green if volume > 50, 2) italics/red if volume < 10, 3) yellow background otherwise as below:

sales.xlsx - Excel

File Home Insert Page Layout Formulas Data Review View Developer Team Tell me... Sign in Share

Clipboard Font Alignment Number Styles Cells Editing

D13

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Category	Product	Month	Volume	Price	Cost	Revenue						
2	Food	Chocolate	Jan	20	\$ 2.00	\$ 1.00	\$ 40.00						
3	Clothing	Jacket	Jan	15	\$50.00	\$35.00	\$ 750.00						
4	Toys	Ball	Jan	55	\$ 1.00	\$ 0.50	\$ 55.00						
5	Food	Chocolate	Feb	80	\$ 2.50	\$ 1.00	\$ 200.00						
6	Clothing	Jacket	Feb	10	\$50.00	\$35.00	\$ 500.00						
7	Toys	Ball	Feb	65	\$ 1.00	\$ 0.60	\$ 65.00						
8	Food	Chocolate	Mar	30	\$ 2.00	\$ 1.00	\$ 60.00						
9	Toys	Ball	Mar	70	\$ 1.00	\$ 0.40	\$ 70.00						
10	Toys	Bat	Mar	10	\$75.00	\$50.00	\$ 750.00						
11	Clothing	Jacket	Mar	8	\$50.00	\$30.00	\$ 400.00						
12	Food	Apples	Mar	100	\$ 3.00	\$ 2.00	\$ 300.00						
13					Total:		\$3,190.00						

QuarterSalesTryIt2 QuarterSalesTryIt3

Ready 100%

Try it: Conditional Formatting Challenge

Question: Take the previous formatting and apply it to whole row:

sales.xlsx - Excel

File Home Insert Page Layout Formulas Data Review View Developer Team Tell me... Sign in Share

Clipboard Font Alignment Number Styles Cells Editing

D13

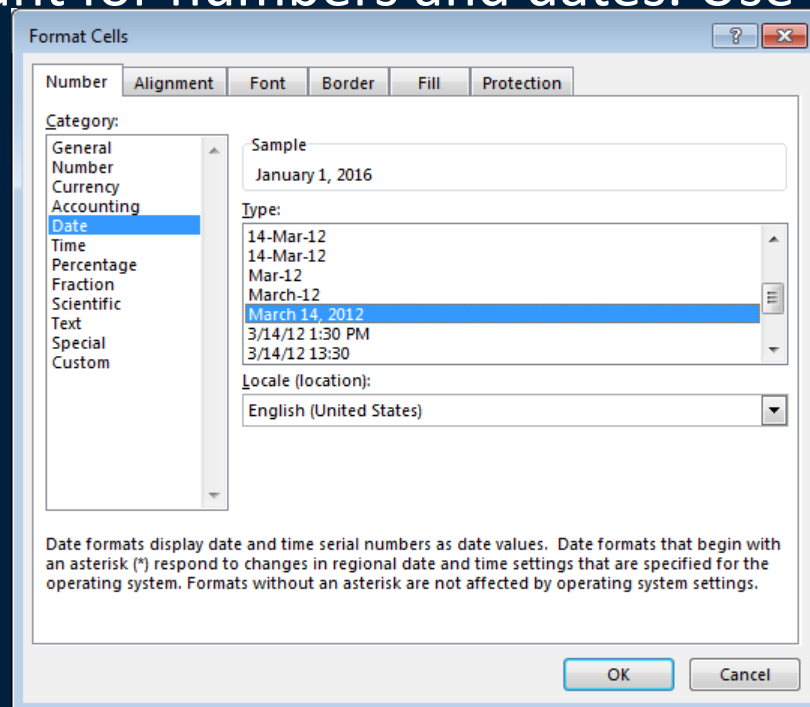
	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Category	Product	Month	Volume	Price	Cost	Revenue						
2	Food	Chocolate	Jan	20	\$ 2.00	\$ 1.00	\$ 40.00						
3	Clothing	Jacket	Jan	15	\$50.00	\$35.00	\$ 750.00						
4	Toys	Ball	Jan	55	\$ 1.00	\$ 0.50	\$ 55.00						
5	Food	Chocolate	Feb	80	\$ 2.50	\$ 1.00	\$ 200.00						
6	Clothing	Jacket	Feb	10	\$50.00	\$35.00	\$ 500.00						
7	Toys	Ball	Feb	65	\$ 1.00	\$ 0.60	\$ 65.00						
8	Food	Chocolate	Mar	30	\$ 2.00	\$ 1.00	\$ 60.00						
9	Toys	Ball	Mar	70	\$ 1.00	\$ 0.40	\$ 70.00						
10	Toys	Bat	Mar	10	\$75.00	\$50.00	\$ 750.00						
11	Clothing	Jacket	Mar	8	\$50.00	\$30.00	\$ 400.00						
12	Food	Apples	Mar	100	\$ 3.00	\$ 2.00	\$ 300.00						
13				Total:			\$3,190.00						

QuarterSalesTryIt3 QuarterSalesTryIt4

Ready 100%

Date and Type Formats

Formatting data helps users read and understand data and is especially important for numbers and dates. Use built-in or custom formats.



Conclusion

Spreadsheets are general purpose tools for data analysis that consist of a table of cells which contain data and formulas.

Formulas contain data values, cell references, and functions.

- Aggregate functions summarize multiple data values into a single value.
- Functions exist for statistics, string manipulation, lookup/indexing, and decisions.
- Absolute addresses use a \$ in front of column and/or row so that address does not change when copying formula.

Conditions are used for making decisions with `IF ()` and for conditional formatting.



THE UNIVERSITY OF BRITISH COLUMBIA

