COMP1022Q
Introduction to Computing with Excel VBA

Advanced Example of Cell Referencing

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Writing a Correct Formula

- In this example we want to know the best country to get profit by buying and then selling lots of iPad 2 tablets

	A	B	C	D	E	F	G	H	I	J
1	**Example of a Formula that uses Absolute and Relative Cell References**									
2	*This example shows the use of a formula which uses both relative and absolute cell references. First, the formula in cell G6 was carefully written. Then the cell was copied and pasted into the area G6 to J14. Because the formula was carefully designed it could be pasted into the target cells without change.*									
3										
4	**Cost of 16Gb wi-fi version iPad 2, in HK$ (May 2011)**	**Cost per iPad 2, if buying this many iPad 2s in that country:**					**Total profit, if buying and then individually selling this many iPad 2s in that country:**			
5	Country	1	5	10	50	100	5	10	50	100
6	Australia	HK$4,543	HK$4,316	HK$4,100	HK$3,895	HK$3,700				
7	Canada	HK$4,677	HK$4,443	HK$4,221	HK$4,010	HK$3,809				
8	Denmark	HK$5,510	HK$5,235	HK$4,973	HK$4,724	HK$4,488				
9	Iceland	HK$5,488	HK$5,214	HK$4,953	HK$4,705	HK$4,470				
10	Norway	HK$5,477	HK$5,203	HK$4,943	HK$4,696	HK$4,461				
11	Poland	HK$5,654	HK$5,371	HK$5,103	HK$4,848	HK$4,605				
12	Sweden	HK$5,488	HK$5,214	HK$4,953	HK$4,705	HK$4,470				
13	UK	HK$5,077	HK$4,823	HK$4,582	HK$4,353	HK$4,135				
14	USA	HK$4,332	HK$4,115	HK$3,910	HK$3,714	HK$3,528				
15										

- The profit for various situations will be shown here - so we want to design an Excel formula which can be copied to this entire area

Make One Formula,
Copy and Paste it into an Area

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8	Denmark	HK$5,510	HK$5,235	HK$4,973	HK$4,724	HK$4,488				
9	Iceland	HK$5,488	HK$5,214	HK$4,953	HK$4,705	HK$4,470				
10	Norway	HK$5,477	HK$5,203	HK$4,943	HK$4,696	HK$4,461				
11	Poland	HK$5,654	HK$5,371	HK$5,103	HK$4,848	HK$4,605				
12	Sweden	HK$5,488	HK$5,214	HK$4,953	HK$4,705	HK$4,470				
13	UK	HK$5,077	HK$4,823	HK$4,582	HK$4,353	HK$4,135				
14	USA	HK$4,332	HK$4,115	HK$3,910	HK$3,714	HK$3,528				
15										

- The usual approach is to first carefully write the formula for the top-left cell

- Then you copy the top-left cell, select the whole area, and paste

Thinking About the Formula

- Each cell in that area needs to show the profit
- Profit is the difference between the income and the cost
- For example, you purchase 5 iPads in Australia
- Here is an illustration of the cost:

	Cost of 16Gb wi-fi version iPad 2, in HK$ (May 2011)	Cost per iPad 2, if buying this many iPad 2s in that country:					Total profit, if buying and then individually selling this many iPad 2s in that country:			
5	Country	1	5	10	50	100	5	10	50	100
6	Australia	HK$4,543	HK$4,316	HK$4,100	HK$3,895	HK$3,700				
7	Canada	HK$4,677	HK$4,443	HK$4,221	HK$4,010	HK$3,800				

cost = cost per iPad * number purchased

- Here is an illustration of the income:

	Cost of 16Gb wi-fi version iPad 2, in HK$ (May 2011)	Cost per iPad 2, if buying this many iPad 2s in that country:					Total profit, if buying and then individually selling this many iPad 2s in that country:			
5	Country	1	5	10	50	100	5	10	50	100
6	Australia	HK$4,543	HK$4,316	HK$4,100	HK$3,895	HK$3,700				
7	Canada	HK$4,67	HK$4,443	HK$4,221	HK$4,010	HK$3,800				

income = cost per iPad * number sold

income = sale price per iPad *   cost =   cost per iPad *

number sold   number purchased

	A	B	C	D	E	F	G	H	I	J
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5	Country	1	5	10	50	100	5	10	50	100
6	Australia	HK$4,543	HK$4,316	HK$4,100	HK$3,895	HK$3,700				
7	Canada	HK$4,677	HK$4,443	HK$4,221	HK$4,010	HK$3,800				

- For this 'profit' cell, you might enter a formula of $=(B6*G5)-(C6*G5)$

  income   *cost*

- The formula is correct for that cell – but if you copy it and paste it into the area, you will get nonsense results:

		1	5	10	50	100	5	10	50	100
4	Cost of 16Gb wi-fi version iPad 2, in HK$ (May 2011)	Cost per iPad 2, if buying this many iPad 2s in that country:					Total profit, if buying and then individually selling this many iPad 2s in that country:			
5	Country	1	5	10	50	100	5	10	50	100
6	Australia	HK$4,543	HK$4,316	HK$4,100	HK$3,895	HK$3,700	HK$1,136	HK$2,158	HK$10,250	HK$19,475
7	Canada	HK$4,677	HK$4,443	HK$4,221	HK$4,010	HK$3,809	HK$265,595	HK$479,399	HK$2,163,289	HK$3,904,737
8	Denmark	HK$5,510	HK$5,235	HK$4,973	HK$4,724	HK$4,488	HK$73,171,460	HK$125,470,762	HK$537,877,472	HK$922,325,394
9	Iceland	HK$5,488	HK$5,214	HK$4,953	HK$4,705	HK$4,470	HK$20,078,248,729	HK$32,707,718,157	HK$133,203,204,311	HK$216,989,684,862
10	Norway	HK$5,477	HK$5,203	HK$4,943	HK$4,696	HK$4,461	HK$5,498,428,414,331	HK$8,509,158,186,436	HK$32,921,121,994,180	HK$50,947,473,280,417
11	Poland	HK$5,654	HK$5,371	HK$5,103	HK$4,848	HK$4,605	HK$1,554,405,712,731,450	HK$2,285,262,068,340,120	HK$8,399,388,071,948,580	HK$12,348,644,115,803,600
12	Sweden	HK$5,488	HK$5,214	HK$4,953	HK$4,705	HK$4,470	HK$426,528,927,573,510,000	HK$595,722,115,974,902,000	HK$2,080,074,858,465,780,000	HK$2,905,187,704,667,190,000
13	UK	HK$5,077	HK$4,823	HK$4,582	HK$4,353	HK$4,135	HK$108,274,368,264,536,000,000	HK$143,662,856,183,218,000,000	HK$476,544,370,046,437,000,000	HK$632,298,543,009,170,000,000
14	USA	HK$4,332	HK$4,115	HK$3,910	HK$3,714	HK$3,528	HK$23,452,228,166,098,500,000,000	HK$29,561,505,916,820,700,000,000	HK$93,155,608,273,232,600,000,000	HK$117,422,534,253,485,000,000,000

Designing The Formula

	A	B	C	D	E	F	G	H	I	J
4	Cost of 16Gb wi-fi version iPad 2, in HK$ (May 2011)	Cost per iPad 2, if buying this many iPad 2s in that country:					Total profit, if buying and then individually selling this many iPad 2s in that country:			
5	Country	1	5	10	50	100	5	10	50	100
6	Australia	HK$4,543	HK$4,316	HK$4,100	HK$3,895	HK$3,700				
7	Canada	HK$4,677	HK$4,443	HK$4,221	HK$4,010	HK$3,800				

- Think about the formula carefully:

$$=(B6*G5)-(C6*G5)$$

- When we copy and paste the formula, we want this column to be fixed, but not the row

  - Here we want the row to be fixed, but not the column

- Here we want the row to be fixed, but not the column

- Here we don't need to fix either the row or the column

- So the formula must be: $=(\$B6*G\$5)-(C6*G\$5)$

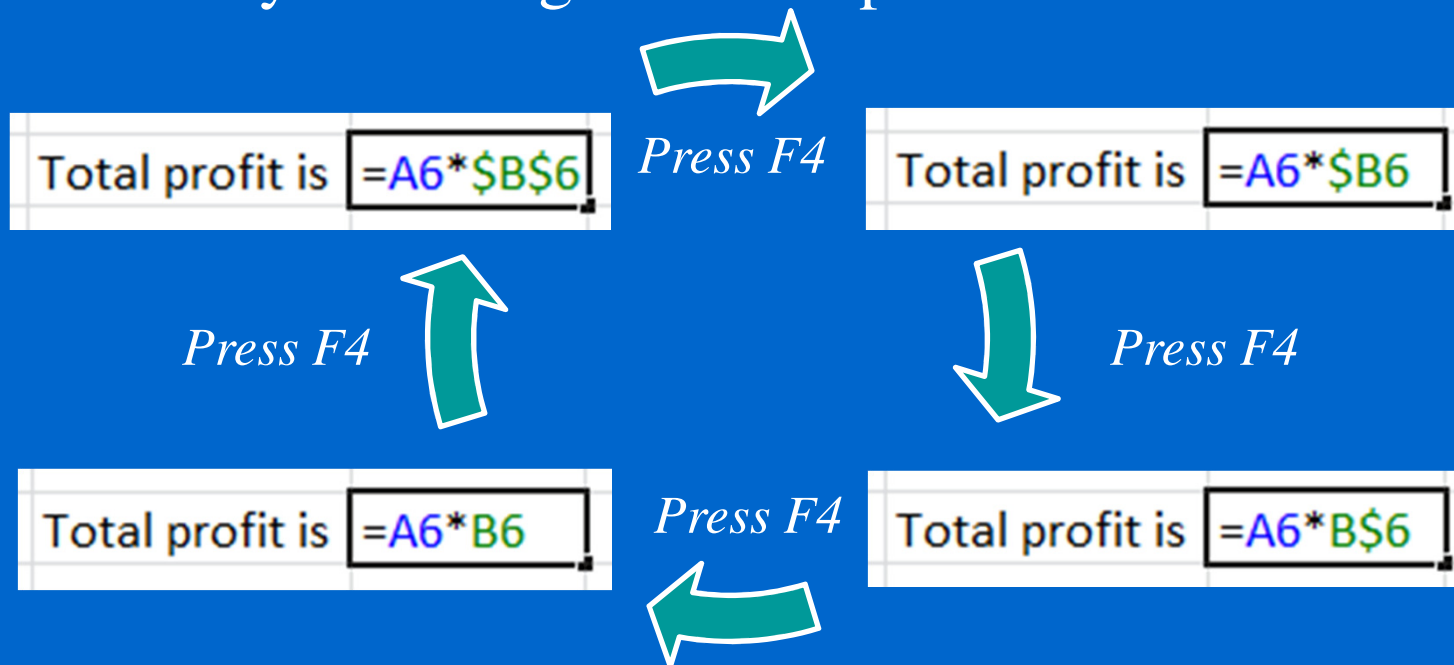- We enter that formula into the top-left cell, copy it, and paste it into the area:

	Cost of 16Gb wi-fi version iPad 2, in HK$ (May 2011)	Cost per iPad 2, if buying this many iPad 2s in that country:				Total profit, if buying and then individually selling this many iPad 2s in that country:			
5	Country	1	5	10	50	100	5	10	50	100
6	Australia	HK$4,543	HK$4,316	HK$4,100	HK$3,895	HK$3,700	HK$1,136	HK$4,429	HK$32,397	HK$84,270
7	Canada	HK$4,677	HK$4,443	HK$4,221	HK$4,010	HK$3,809	HK$1,169	HK$4,560	HK$33,353	HK$86,755
8	Denmark	HK$5,510	HK$5,235	HK$4,973	HK$4,724	HK$4,488	HK$1,378	HK$5,372	HK$39,293	HK$102,207
9	Iceland	HK$5,488	HK$5,214	HK$4,953	HK$4,705	HK$4,470	HK$1,372	HK$5,351	HK$39,136	HK$101,799
10	Norway	HK$5,477	HK$5,203	HK$4,943	HK$4,696	HK$4,461	HK$1,369	HK$5,340	HK$39,058	HK$101,595
11	Poland	HK$5,654	HK$5,371	HK$5,103	HK$4,848	HK$4,605	HK$1,414	HK$5,513	HK$40,320	HK$104,878
12	Sweden	HK$5,488	HK$5,214	HK$4,953	HK$4,705	HK$4,470	HK$1,372	HK$5,351	HK$39,136	HK$101,799
13	UK	HK$5,077	HK$4,823	HK$4,582	HK$4,353	HK$4,135	HK$1,269	HK$4,950	HK$36,205	HK$94,175
14	USA	HK$4,332	HK$4,115	HK$3,910	HK$3,714	HK$3,528	HK$1,083	HK$4,224	HK$30,893	HK$80,356

- You can use *Ctrl `* to check that the formulas are correct:

	Total profit, if buying and then individually selling this many iPad 2s in that country:		
5	10	50	100
=($B6*G$5)-(C6*G$5)	=($B6*H$5)-(D6*H$5)	=($B6*I$5)-(E6*I$5)	=($B6*J$5)-(F6*J$5)
=($B7*G$5)-(C7*G$5)	=($B7*H$5)-(D7*H$5)	=($B7*I$5)-(E7*I$5)	=($B7*J$5)-(F7*J$5)
=($B8*G$5)-(C8*G$5)	=($B8*H$5)-(D8*H$5)	=($B8*I$5)-(E8*I$5)	=($B8*J$5)-(F8*J$5)
=($B9*G$5)-(C9*G$5)	=($B9*H$5)-(D9*H$5)	=($B9*I$5)-(E9*I$5)	=($B9*J$5)-(F9*J$5)
=($B10*G$5)-(C10*G$5)	=($B10*H$5)-(D10*H$5)	=($B10*I$5)-(E10*I$5)	=($B10*J$5)-(F10*J$5)
=($B11*G$5)-(C11*G$5)	=($B11*H$5)-(D11*H$5)	=($B11*I$5)-(E11*I$5)	=($B11*J$5)-(F11*J$5)
=($B12*G$5)-(C12*G$5)	=($B12*H$5)-(D12*H$5)	=($B12*I$5)-(E12*I$5)	=($B12*J$5)-(F12*J$5)
=($B13*G$5)-(C13*G$5)	=($B13*H$5)-(D13*H$5)	=($B13*I$5)-(E13*I$5)	=($B13*J$5)-(F13*J$5)
=($B14*G$5)-(C14*G$5)	=($B14*H$5)-(D14*H$5)	=($B14*I$5)-(E14*I$5)	=($B14*J$5)-(F14*J$5)

Cycling Through the Possibilities

- While you are entering a formula which has a cell reference you can press the F4 key
- Excel will change the cell reference you are currently writing (without changing anything else)
- It will cycle through the four possibilities:

Total profit is =A6*B6   *Press F4*   Total profit is =A6*$B6

Press F4   *Press F4*

Press F4

Total profit is =A6*B6   *Press F4*   Total profit is =A6*B$6

- In this example the user was entering the last cell reference (B6), so this is the part that was changed when F4 was pressed