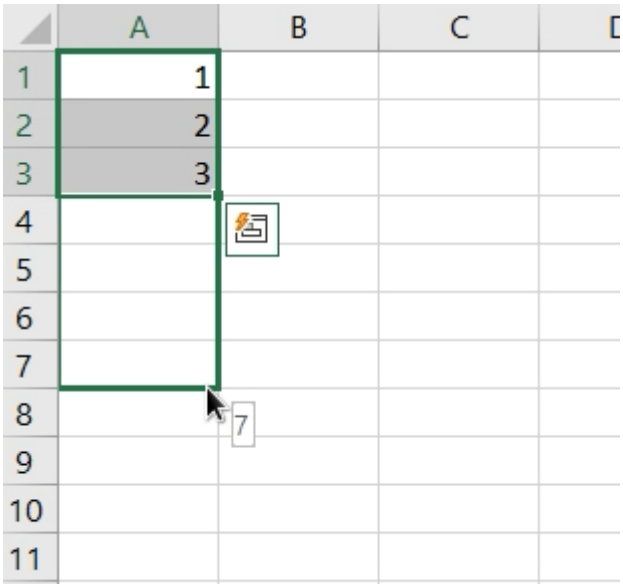
Modelling and Differential Equations - Discrete Modelling
/ Week 11: Working with data/ Dragging in Excel

Dragging in Excel

We are going to make extensive use of dragging formulae in Excel, and I want to make sure you are comfortable with and understand this. Please work through these notes, which cover some techniques you may be aware of but that we are going to make use of this week.

Dragging a pattern

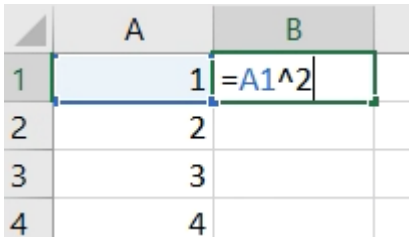
Excel will extrapolate (sometimes incorrectly) from a pattern it spots. For example, type `1` into cell `A1`, `2` into cell `A2` and `3` into cell `A3`. Now highlight these three cells and click and drag the bottom right corner down the `A` column. Excel spots what you are doing and fills the area you have dragged with values.



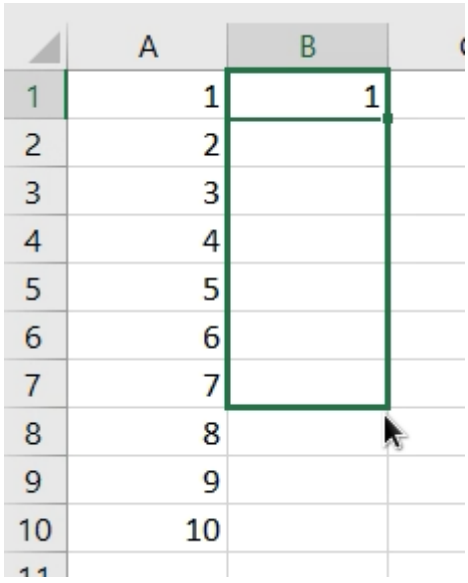
Dragging a basic formula

If you enter a formula that involves another cell, you can drag this and Excel will update the referenced cell as you drag.

To see this in action, add a formula into cell `B1` that says `=A1^2`. This will square the number in cell `A1` and place the result in `B1`.

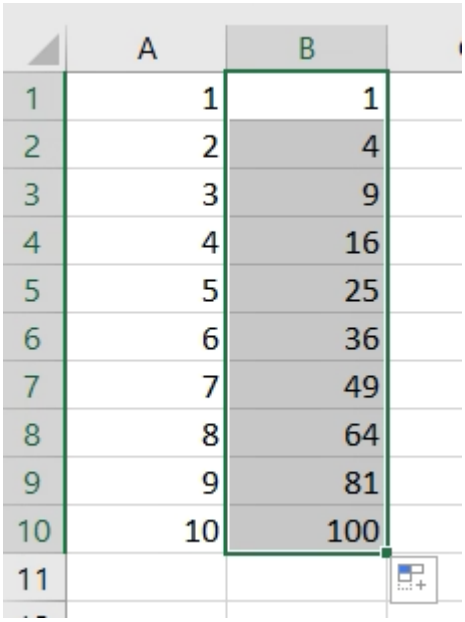


Now click the cell `B1`, then click and drag its bottom right corner down the column. Or a quick trick is that if you double-click on the bottom right corner it will fill column `B` to the same level as column `A`, which can help if you have a big column to drag down.



This will put the same formula in all cells you have dragged over, with the added bonus that it updates the reference to `A1` to be the cell to the left of the current cell.

current cell.



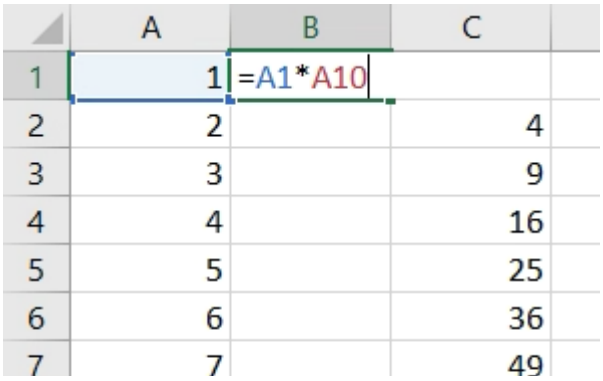
	A	B
1	1	1
2	2	4
3	3	9
4	4	16
5	5	25
6	6	36
7	7	49
8	8	64
9	9	81
10	10	100
11		

You can do the same with columns by clicking the bottom right corner and dragging along the column.

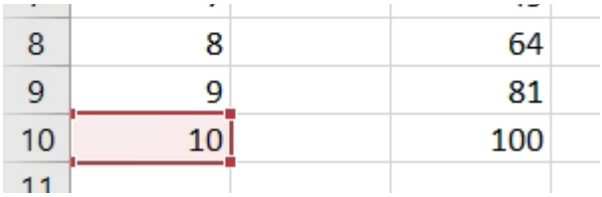
Dragging a formula with fixed cell

The way Excel updates the formula can be really useful, but sometimes it isn't what you want to happen. Insert a column between column A and column B and we will work in this new column B.

Say we want to multiply each value in column `A` by the value in cell `A10`. Type into cell `A1` the formula `=A1*A10`.



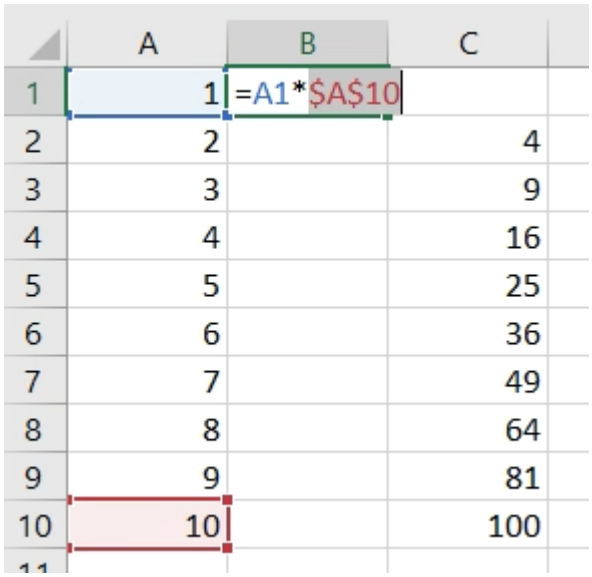
	A	B	C
1	1	=A1*A10	
2	2		4
3	3		9
4	4		16
5	5		25
6	6		36
7	7		49



8	8	64
9	9	81
10	10	100

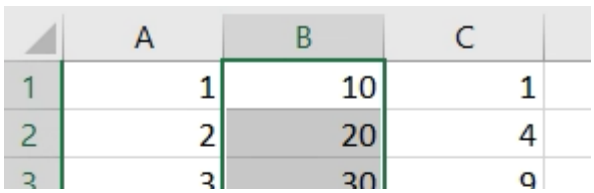
If you now drag this formula down the column, Excel will update the `A1` to `A2`, `A3`, etc., which is good. Unfortunately it will also update the `A10` to `A11`, `A12`, etc., which will not give us the values we want.

We can stop Excel updating a cell reference in a formula using `$`. To fix a reference to always use the same cell, you may know that you can select a cell reference or put your cursor immediately after it and press the `F4` key. Doing this here changes `A10` to `$A$10`.

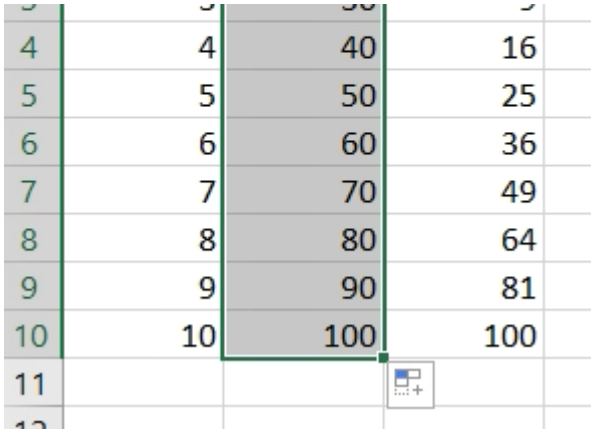


	A	B	C
1	1	=A1*A10	
2	2		4
3	3		9
4	4		16
5	5		25
6	6		36
7	7		49
8	8		64
9	9		81
10	10		100

Now if you drag down the column you will see the reference to `A1` updates but not the reference `$A$10`.



	A	B	C
1	1	10	1
2	2	20	4
3	3	30	9



4	4	40	16
5	5	50	25
6	6	60	36
7	7	70	49
8	8	80	64
9	9	90	81
10	10	100	100
11			

Pressing F4 was a convenient shortcut, but you should know it has done two things. It put `$` before the letter `A` to fix the column and it put `$` before the number `10` to fix the row. There is nothing special about these symbols, they are just the `$` key on your keyboard, so you can type them instead of pressing F4. There are situations where we might want to fix just the column or row, but not both.

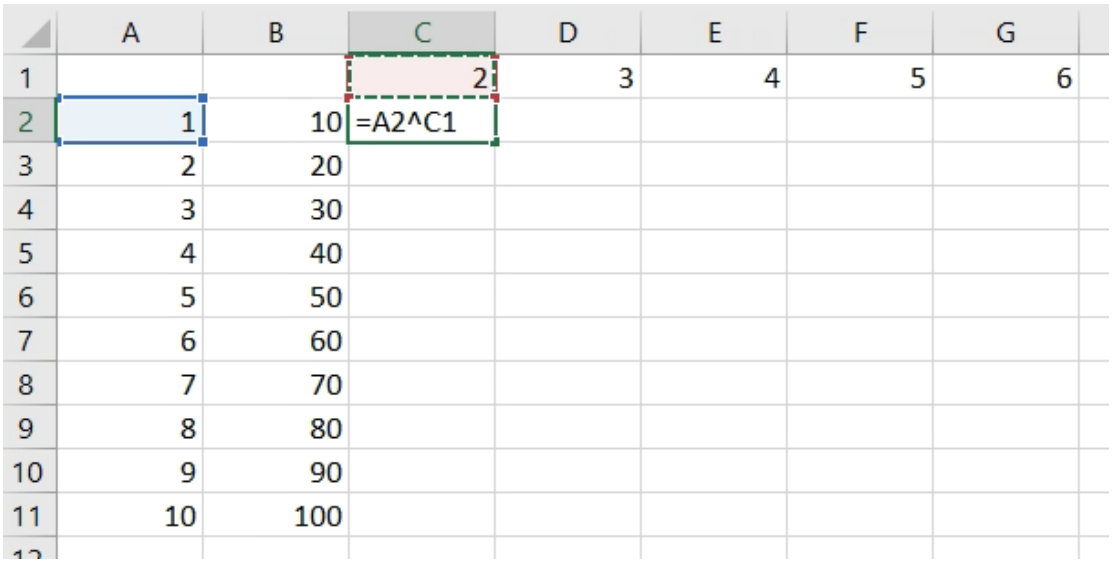
Dragging a formula with fixed row or column

Move now to column D. Insert a row above row 1. Put `2` in cell `C1`, `3` in `D1`, `4` in `E`, `5` in `F1` and `6` in `G1`. We are going to put these powers of the values in column A into these columns.

	A	B	C	D	E	F	G
1			2	3	4	5	6
2	1	10	1				
3	2	20	4				
4	3	30	9				
5	4	40	16				
6	5	50	25				
7	6	60	36				
8	7	70	49				
9	8	80	64				
10	9	90	81				
11	10	100	100				

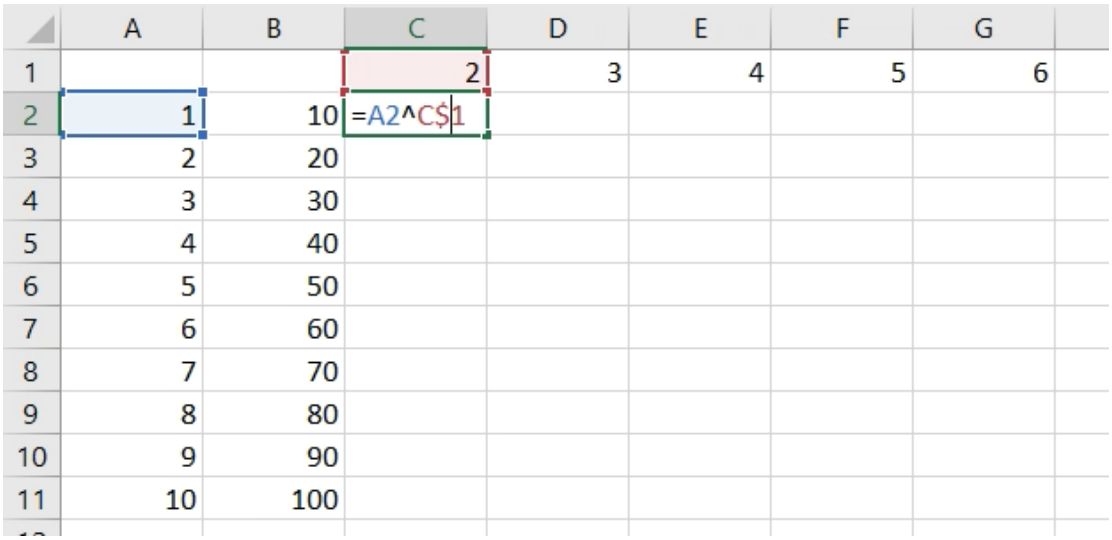
Clear the values `4` to `100` from cells `B3` to `B11`. Update the formula in `C2` to

`=A2^C1`.



	A	B	C	D	E	F	G
1			2	3	4	5	6
2	1	10	=A2^C1				
3	2	20					
4	3	30					
5	4	40					
6	5	50					
7	6	60					
8	7	70					
9	8	80					
10	9	90					
11	10	100					

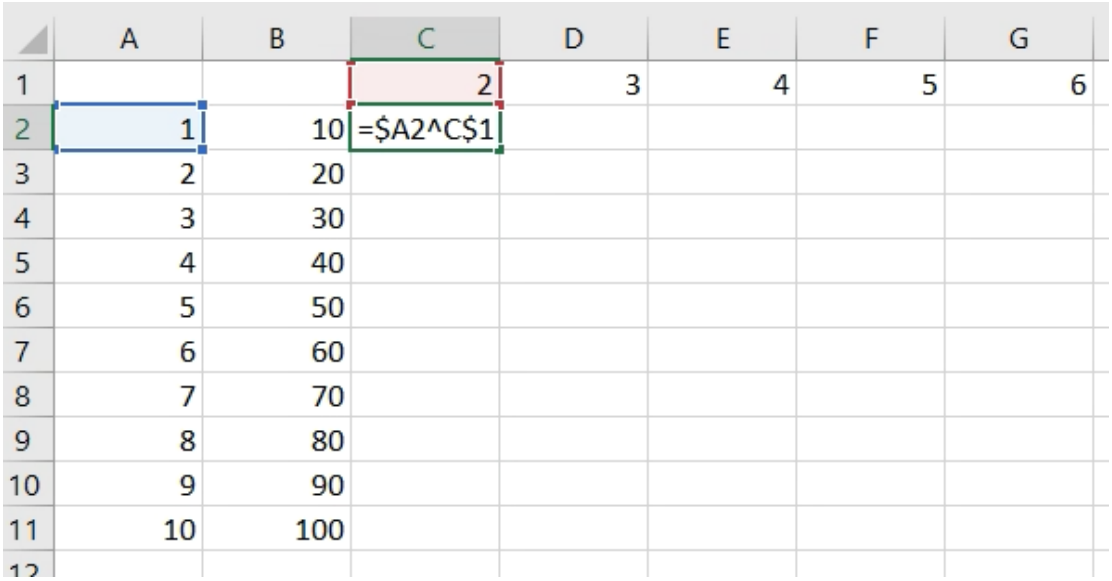
We want to drag down column `B` so that the references to cells in `A` are updated but the reference to `C1` is fixed. We could change `C1` to `$C$1` to achieve this. However, this would fix both the column (if we drag sideways) and the row (if we drag vertically), when we only need the row to be fixed - we always want to refer to the first row of this column. So change the formula to `=A2^C$1` to just fix the row number.



	A	B	C	D	E	F	G
1			2	3	4	5	6
2	1	10	=A2^C$1				
3	2	20					
4	3	30					
5	4	40					
6	5	50					
7	6	60					
8	7	70					
9	8	80					
10	9	90					
11	10	100					

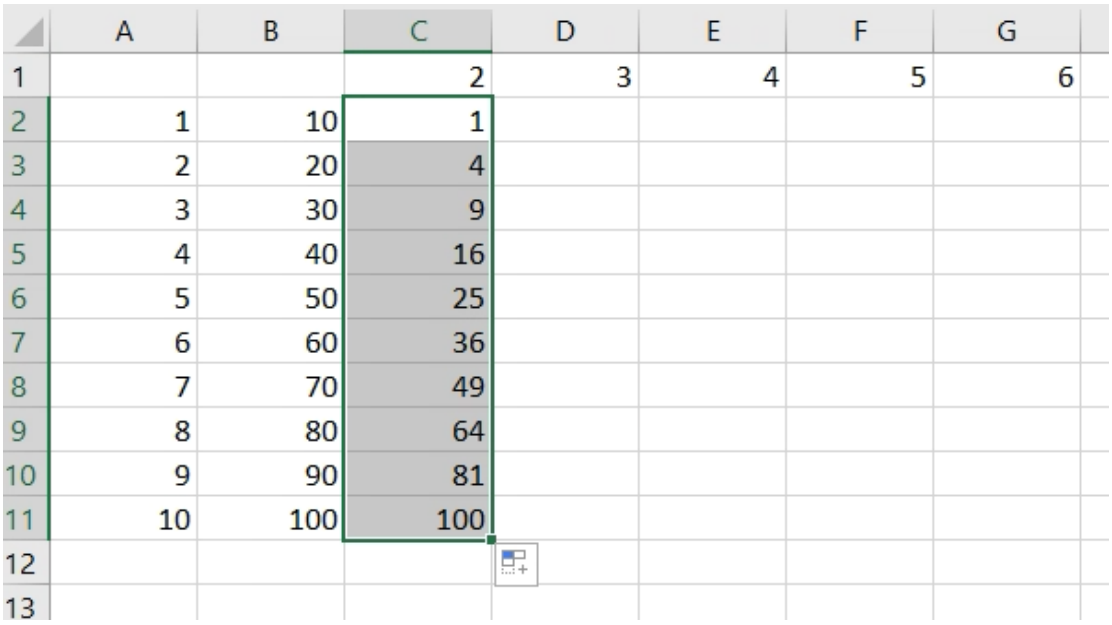
We also want to drag across rows `D` to `G` but have the formulae always refer to the entry on this row in column `A`. To do this, change `A2` to `$A2`. Here we fix

the entry on this row in column `A`. To do this, change `A2` to `$A2`. Here we fix the column letter but not the row number.



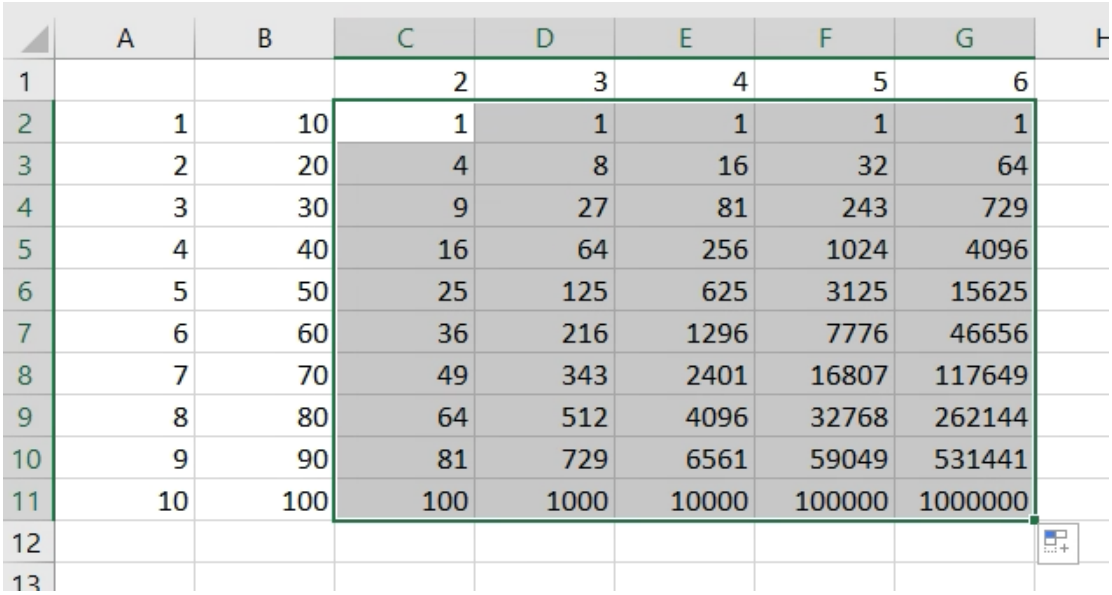
	A	B	C	D	E	F	G
1			2	3	4	5	6
2	1	10	=$A2^C$1				
3	2	20					
4	3	30					
5	4	40					
6	5	50					
7	6	60					
8	7	70					
9	8	80					
10	9	90					
11	10	100					

Now drag this formula down column B and you will see the values `4` to `100` return. The reference to `$A2` has updated to `$A3`, `$A4`, etc.



	A	B	C	D	E	F	G
1			2	3	4	5	6
2	1	10	1				
3	2	20	4				
4	3	30	9				
5	4	40	16				
6	5	50	25				
7	6	60	36				
8	7	70	49				
9	8	80	64				
10	9	90	81				
11	10	100	100				
12							
13							

Now, with the entries in `B2-B11` highlighted, click and drag a second time, this time across rows `D` to `G`. You should see that the reference to `C$1` has updated to `D$1`, `E$1`, etc.



	A	B	C	D	E	F	G	H
1			2	3	4	5	6	
2	1	10	1	1	1	1	1	
3	2	20	4	8	16	32	64	
4	3	30	9	27	81	243	729	
5	4	40	16	64	256	1024	4096	
6	5	50	25	125	625	3125	15625	
7	6	60	36	216	1296	7776	46656	
8	7	70	49	343	2401	16807	117649	
9	8	80	64	512	4096	32768	262144	
10	9	90	81	729	6561	59049	531441	
11	10	100	100	1000	10000	100000	1000000	
12								
13								