Intro: Hello and welcome to the CPA Australia podcast. Your weekly source of business, leadership, and public practice accounting information.

Neale Blackwood: In this podcast I wanted to focus on Excel's functions. Now I did a post for the INTHEBLACK website, so it didn't appear in a magazine but it's on the website, in January of this year, so 2018, and I produced a list of functions that accountants should be able to use. And I wanted to expand on that and also explain what some of the functions can do as well. That list also includes the months that I've written articles about those functions. So you can go back and track the articles. So all of the articles from the last five years have got companion videos and some of them have companion files as well. So, you can check them on the INTHEBLACK website. If you click on the topics at the top there's an 'Excel yourself' section and that's where all of my articles appear. And as I mentioned you can watch videos on them.

Neale Blackwood: So let's make a start, the first function, so we'll start with the adding up function, so we'll start with the sum function. That's obviously the most popular and most used function in Excel. It's got its own little icon that you can insert the SUM function. A little tip if you're a key board person, to insert the SUM function you can also hold the alt key down and press the equals sign. So alt equals will insert the sum function as well.

Neale Blackwood: Now when I'm doing training on Excel and the SUM function, a lot of people are unaware of two things that the SUM function can do. The first is pretty straight forward, basically it can add up separate ranges, so different ranges. So instead of having equals sum plus sum plus sum, you can actually just have one sum function and you separate the ranges with commas. So, sum, open bracket, have a range, then you go comma, then another range, comma, and you can keep going. I think it's limited to something like 64 or 128, it's some binary number. And basically yeah, you just need the one sum function to actually add up multiple ranges.

Neale Blackwood: Now the other thing that the sum function allows you to do, and this is really cool, is that it allows you to sum through the sheets. So for example, if you wanted to add up all of the C4 cells in lots of sheets, providing the sheets are all next to each other, you can actually add them up using the sum function. Instead of going plus, plus, plus, which is what most people do, you can actually create a formula. And to do it all you do is equals, sum, open bracket, then click on the first sheet and let's say cell C4, then hold the shift key down and click on the last sheet in the range and that's it. Hit enter and you will have added up every C4 cell in all of those sheets that you had just selected. So the trick there is to hold the shift key down to click the last sheet. You can also type it, when you have a look at the reference you'll see it's pretty straight forward and you can type it if you want.

Neale Blackwood: I use placeholder sheets when I'm going this so I'll have a lower case 'a' and a lower case 'z' and they'll be black and they'll be on either end like bookends to the sheets that I want to add up. And so the formula is incredible short, it's

actually a;z and then you'll have the exclamation mark and then you'll have C4 and that's it. And that adds up everything between the two sheets. So have a play with that, that's a really powerful feature, I use that in financial models and budgeting. The assumption there is that the structure at the top of the sheet has to be identical when you're adding up through the sheets like that. But, as long as the tops identical you can have what you want below that. So, if you have a template at the top of the sheet then you can have customised entries below it that may relate to specific calculations.

Neale Blackwood: Okay, the next function that you could know is 'sum if s'. There is a 'sum if' function but that only handles one criteria. So you can do a sum based on one criteria. But 'sum if s', so it's sum if with an 's; on the end allows you to do multiple criteria. So you can refer to whole columns, you can refer to whole rows and it's a reasonably quick calculation. It does have a couple of limitations though, it doesn't work on closed files and it doesn't handle leading zeros in codes correctly which is a weird one. So if you're got codes like 0123, 00123, it'll actually treat them all the same as 123 which doesn't really make sense to me but you have to be careful when your codes have leading zeros in it and you're using 'sum ifs'.

Neale Blackwood: The way to get around that if you do have those leading zeros is to use the 'sum product' function. Now 'sum product' is my favourite function. The down side with 'sum product' is that really cool way to use it is not in the help system. You might want to check out my articles on that on the website. The 'sum product' function will work with closed files and it can do multi criteria summing, it can also do multi criteria counting. It is a bit slower than 'sum ifs' but the other advantage with 'sum product' is you can use other functions between the brackets and you can create some really complex calculations there.

Neale Blackwood: For example, if you had a list of let's say sales and you had dates there, you could create a 'sum product' function that would add up all of the sales on Friday or a Saturday or however you wanted. And you'd use another function called the 'weekday function' within the brackets of the 'sum product' to achieve that. Now 'sum if', or 'sum ifs' won't let you do that, okay, whereas 'sum product' does.

Neale Blackwood: Okay now the one function that's really powerful but gets overlooked is the 'subtotal' function. Now subtotal was built to handle subtotalling but it has a couple of ... It has at least one super power. It has the ability to add up only the visible cells in a range. A subtotal starts with a number, so typically the number is nine and that means it's going to perform a sum. Now the number at the front refers to the calculation because subtotal can actually perform lots of calculations. It can do averaging, counting, min and max, things like that. But the number nine means it's going to perform a sum function.

Neale Blackwood: But if you use 109 instead it'll actually be able to add up just the visible rows. So, if you've hidden rows then they will be ignored in the subtotal calculation. And even the subtotal nine, that will work like that in a filtered list. So if you apply a

filter, so control shift 'l' is the quick way to insert the filter arrows in a table, and then if you apply a filter to that table and then put a subtotal that's adding up that range and use the nine it will actually ignore the hidden rows. So because you can now filter by colour, so if you right click on a range and go down to filter you'll see you have the ability to filter by colour, that you can actually use the subtotal if you filter by colour you can then add up just those colours if that's what you're trying to achieve.

Neale Blackwood: There is another function that's used for summing and it's the aggregate function. Now this is a new function, it was added in Excel 2010, it has the super power that it can ignore errors in the range. It's very similar to subtotal but it works sightly different. So check that out, aggregate, it can ignore errors. In general, you shouldn't have errors in your range but if you do and you still need to do calculations then the aggregate will allow you to ignore errors.

Neale Blackwood: Okay, so that's all of the summing functions sorted. So let's have a think about logic. The main logic function is the 'if' function. That allows you to build decision making into your spreadsheets so that you, you know, one thing happens you can do something, if something else happens you can do something else. So you can handle a lot of different scenarios. I should mention at this point that the 'if' function is the most common cause of errors in spreadsheets. So if you do or when you do use the 'if' function always make sure you test it and test it for things like zeros and blanks and errors and just make sure it is doing what you're expecting. So it's really important to test your 'if' functions because the 'if' function is pretty much like programming so you do need to make sure it's doing what you think it's doing.

Neale Blackwood: Two other functions that work really well with the 'if' function, 'and' function and the 'or' function. Now these allow you to look at multiple conditions. The 'and' function and the 'or' function return true or false but you can look at multiple conditions between their brackets to arrive at that single true or false. The ‘and’ function requires every single condition to be met, so it's sort of based for validations and things. If one of the conditions that you're looking at returns false then the 'and' function will return false.

Neale Blackwood: The 'or' function is a bit more liberal, the 'or' function will look at multiple conditions and if any one of those returns true then the 'or' function returns true. Now they're not opposite, people think that they're opposite but they're not because if every condition is true that they look at then they'd both return the same result and if every condition is false they will also return the same result. In the middle when you've got true's and falses and things, then they do give the opposite result, but they're not opposites.

Neale Blackwood: Another function, it's a reasonably new function, it was added in Excel 2007, is the 'if error' function and this makes handling errors a lot easier in Excel. Basically you just go if error, open bracket, and then you just put the calculation that may have the error in there, then you'd put a comma, then you're put what you want to do if an error is found. So 'if error' is really good, you can put in a

blank or a zero or an error message and the one that goes along with it, this was added very recently in Excel 2013, is 'if na'. The na error in Excel is typically given by vlookup and match and a couple of others.

Neale Blackwood: Basically it means that Excel can't find something. Now the problem with the na error is there could be different reasons for that. So in a vlookup for example, you could be looking up a code that's a new code, it's a valid code but it may be it hasn't been added to the table yet. So you might need to add that new code to the table. You could have just a type, so someone's made a mistake in entering the code and so the na error is valid and so they just need to re-enter the code. With the na error, sometimes you want to handle that error slightly different to some of the other errors that you'll encounter like division by zero and ref and things like that.

Neale Blackwood: So the 'if na' works the same way as 'if error' but it only handles the na error. So typically you'll go 'if na', open bracket, and then you'll go vlookup, have your calculation, comma, and then you'll say what you want to do if an error is found. And then you might have an 'if error' in front of the 'if na'. So you might have ... A typical structure is 'if error' open bracket, then 'if na' open bracket, and then you'll have the vlookup, then you'll have the first comma for the 'if na' and that will be maybe say put the text 'missing' in quotation marks, close the bracket, then you'll have another comma and this is the rest of the errors and you might just display, for example, the word 'error', so comma 'error' and you have to have quotation marks if you're referring to text.

Neale Blackwood: So that's a fairly common construct now. It's a lot shorter than it used to be in the old days to try and handle the na error differently you had to use a function called 'is na' and that took, you basically have to duplicate the formula so it's a lot easier now with 'if error' and 'if na'.

Neale Blackwood: Speaking of vlookup, that's also a function you should be aware of. It's interesting, I've seen a lot of stuff on Linkedin lately where people are saying you shouldn't use vlookup and I've never, I haven't used vlookup in the last ten years and things like that. Vlookup is a really easy function to use, it has its limitations and as long as you're aware of those limitations it's not too bad to use. Typically you'll have a fixed reference for the table, so that's one thing you need, it's also really good to use formatted tables for the table that you're looking up. So I'm not going to talk about formatted tables a lot today, I have covered that, I think I've mentioned it in other podcasts and there's some stuff, I did an article earlier this year on formatted tables so check that out.

Neale Blackwood: In general, don't hard key in the column number in a vlookup, usually it'll be something like comma two, or comma three. Try and either use the match function to identify the column or have that as a separate cell that you actually key in into the cell because then you can change that a lot easier than if you have to change it in the formula. And also on the end, if you want an exact match you usually put comma false, but you can put comma zero because false

and zero are the same. So comma zero on the end is the same as having comma false, just a bit quicker to type.

Neale Blackwood: Okay now the vlookup, when people don't use vlookup they use index and match together. So index function and the match function. Index, 'sum product' my favourite function, well index is probably my second favourite function. Index is so flexible in what you can do with it, when you combine it with the match function you can do a very flexible lookup. You can lookup in like two directions if you like. So index match is the preferred way to do lookups but as I said, vlookup is simple to use, that's it's advantage. Little tip for looking up something that might not be there, you can use the 'count if' function. So 'count if' will count how many times something appears in a range, well you can use the 'count if' function on a range to see if something's there first and if it is then you can do the calculation, otherwise you can do something else, so you can combine that with an ‘if’ function.

Neale Blackwood: Okay, let's have a look at dates. Now the dates functions that Excel has can make it easier to create your monthly reports and you know your budgets, things like that. ‘EO month’ is a good one, so it stands for ‘end of month’, yes they have an end of month function. So EO month basically it's got two parts to it, you give it a date and then you go comma and then you say how many months from that date you want to find out the end of month. So if you go comma zero, it's going to be the current month and that will give you the last day of the month, the last calendar day of the month.

Neale Blackwood: You can also hack it and find the first day of a month. Basically as an example, if we've got the current month and we find, let's say we've got the ... Where are we, I'm recording this in November, so let's say I'm on the 20th of November and I want to actually return from the 20th of November, I want to return the first of November. If I've got the 20th of November in a cell, let's say A1, I can go equals, EO months, open bracket, A1, comma, minus one, close the bracket. So that's going to give me the end of last month and then I just go plus one and that'll give me the first of November. So you can hack the EO month function to give you the first of the month as well.

Neale Blackwood: The other date function that's worth learning is the 'e date' function. What that does is it allows you to increment from a date by a number of months. So this can be really good for things like leases where you need to go, let's say, 48 months or 60 months from a date. You can do that really easily with the 'e date' function. Again, it takes two inputs, you have the date, comma, and then the number of months from that date that you want to increment it. 'e date' works really well and it works really well with the end of the month as well, so you can play around with that.

Neale Blackwood: When you're working with days, obviously you can add a number of days to a date to increment it, you can also subtract dates from one another to figure out how many days in between, but if you're working with work days or weekdays there are two functions that are worthwhile looking at. One is called 'workdays'

and what it does it gives you the number of working days between two dates. It can take into account public holidays as well. So that can be useful if you do have a couple of dates and you want to find out how many workdays between those, you can use the workdays function.

Neale Blackwood: Now, on a similar note, the net workdays allows you to take a date and then add a certain number of workdays to that date and tell you when that will be finished. So if you've got like a basic project management system in Excel and you want to add workdays you can use the 'net workdays'. And public holidays, you can also include a range of public holidays for that one as well.

Neale Blackwood: Text, Excel works really well with text. The most common text function that people us is the 'trim' function. So 'trim' allows you to remove leading and trailing spaces. Now there the problems, if you have a vlookup that's not working it tends to be because of leading and trailing spaces. When you download data from other systems, a lot of them have that leading and trailing spaces in there. They might pad a code and so the 'trim' function will remove those. I used to think that's all it removed but it does actually remove spaces in between the codes as well but it leaves one. So if you had three spaces between say two words, it would reduce those three spaces to one space when you use the 'trim' function. So just be aware of that. It's not a real big deal but certainly for removing leading and trailing spaces the 'trim' function works brilliantly.

Neale Blackwood: The 'text' function, so talking about text, there is a 'text' function and you use this to convert a date into a text date. There's a wonderful function, I love the name, concatenate, concatenate allows you to join text together and I think it's probably the longest function name in there: concatenate. But there's an easier way to do it, you can actually use the ampersand symbol which is above the number seven on your keyboard and you can join text together using that ampersand but if you try and join a date to some text, say you might say report four and then you like that to a cell that's got a date in it, it'll actually return a number but not the date. So what you need to do is you need to wrap that date in a text function and then go comma and then within quotation marks you need to specify the type of date you want to use. So for example, you might have equals 'text', open bracket, A1, comma, and then you'd have quotation marks and then you might have MMM-YY, close the quotation mark, close the brackets, and that will give you the shortened version of the month and the year.

Neale Blackwood: So if you open up the format cells dialogue, so control one and if you ... Control one is the quickest way to format anything but don't use the one on the numeric keypad on the right hand side because that doesn't work. You need to use the one on the main keyboard. So control one opens up the format cells, in the number tab at the bottom of the list is custom number formats and those formats are the formats you can use with the 'text; function. You just need to enclose them in quotation marks. Now if you've got the latest version of Excel and it's been updated you'll also have a function called 'text join', now that allows you to join text together, it's better than concatenate and even better

than the ampersand symbol because it'll take a range and you can also specify what you want to have as a delimiter. So for example, you could have a whole lot of words in separate cells and you could tell it to join all of those words together, so you could create a sentence, and then it'll put the space in between all of those words as well. If you're creating codes you can put whatever you want between 'em, so you might want to use the dash or something like that.

Neale Blackwood: Okay, we'll finish off with some sundry ones, so these didn't really fit in to any of the others and the first one is 'round'. So when you're rounding you can round to decimal places, you can round to zero. A lot of people don't realise, you can round to minus numbers and when you do, if you round to minus two for example you'll be rounding to hundreds and in a lot of cases that's what you should be doing your budgets to. It doesn't make much sense to round to cents or even, to be honest, even dollars in a budget, you might as well just round to minus one so you're rounding to ten dollars. So have a think about that, that's the 'round' function. So minus numbers round to the left of the decimal point. So minus three will round to thousands.

Neale Blackwood: This is a function that doesn't fit into any category, okay, this is the 'indirect' function. Now I have written an article on it recently. Indirect is hated by a lot of people, mainly because it allows you to create formulas but those formulas don't work when you're trying to find precedence and dependence and things like that because what the 'indirect' function does is it allows you to create a references to a cell or a range by using text and it converts that text into that range. I use it also with range names, it's very powerful when you use it with range names. But indirect allows you to create a reference to a cell by basically combining text and you need to basically replicate that reference between the brackets and it can actually do some magical stuff which as you can see ... You can check out one of my recent articles on the 'indirect' function.

Neale Blackwood: The 'indirect' function does come with a warning, okay, there's a lot of good stuff about it but it also is what is called volatile. Now volatile functions in Excel calculate every single time Excel calculates, whether they need to or not. Most functions only calculate when something in their range changes but indirect calculates every single time Excel calculates. So what you need to do is just be careful you don't use too many indirects because it can impact the speed of your file. So just a warning with the indirect, it can slow things down as well.

Neale Blackwood: And the last one is 'get pivot data'. Now most people don't like 'get pivot data' because it appears when they least expect it. So if you're trying to link to a cell in a pivot table you will find that when you link there, instead of installing a link there it'll actually install a function in that cell and the function is all text so it's not really flexible so that's why people think it's not really useful but funnily enough, a lot of people in Microsoft use 'get pivot data' and if you've got a pivot table you can extract anything out of that pivot table using 'get pivot data'. The down side with pivot tables is that they are not laid out as you might like them, okay. So they'll include all the data but the layout may not be just right for what you want.

Neale Blackwood: So if you do need to actually control what it looks like you can use get pivot data to take the data and just lay it out a lot better. So 'get pivot data' is a powerful function. There is an option to get rid of 'get pivot data' as well in terms of when you link to a pivot table. If you go onto a pivot table, click on the analyse, click on the far left, then there is a ... Go to pivot table, I think it's options and then there should be a little tick box where you can turn off the 'get pivot data' insert which is there and you can turn it back on again. So 'get pivot data', I've used that a number of times, it does have its uses, it does allow you to build up a report in the layout that you want based on a pivot table which is obliviously has to get updated. So the 'get pivot data' will only extract from the pivot table so it needs to be refreshed.

Neale Blackwood: Okay, so there was quite a few functions there, so hopefully you're already working with some of those and maybe all of those. Those functions can basically set you up to create most files in Excel. There are other functions, Excel has hundreds of functions, a lot of them are statistical and other things like that. Certainly for accounting those functions that I've listed today are the main ones and as I mentioned there's a best Excel updates for accountants, there'll be a link to it in the podcast notes but you can also just jump on the INTHEBLACK website, check out the topics and if you go to excel yourself, then on the right hand side, the best Excel updates is one of the most popular ones. So you can check those out, thanks for listening and good luck with your excel functions.

Neale Blackwood: Thanks a lot.

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