

The Tester's Tool Box

Microsoft Excel Part 1, Using Alternate Row Shading

By Dave Whalen

Ask any craftsman and they will tell you, there is at least one tool in their tool box that they cannot do without. For me, that tool is Microsoft Excel. While there are probably a thousand different ways to use Excel to simplify your testing, I have a few favorites. Here's one...

First, we need to define a few key terms. Let's take a journey back in time to that Elementary School math class where we first learned division. Or, better yet, let's talk pizza:

> Dividend - The dividend is the item or object we want to divide. It's the whole pizza. On our pizza there are 20 pieces of pepperoni.

> Divisor - The divisor is the number that we want to divide the object (pizza) into. For our example it will be the number of people sharing our pizza. To be fair (and to avoid potential violence), we want to be sure everyone gets an equal amount of pepperoni. Let's assume we need to feed 4 kids.

> Quotient - Expanding our pizza analogy – the quotient is the number of pieces of pepperoni that must be given to each person to ensure a fair and equal pepperoni distribution. Typically the quotient is the answer to the question we're trying to answer. We have 20 pieces of pepperoni and 4 starving 5 year-olds, so we want to cut our pizza in such a way that there are 5 pieces of pepperoni per child.

> Remainder - We're lucky - we can successfully provide each child with an equal amount of pepperoni. But - what if there were 21 pieces of pepperoni? Each child would still get 5 pieces, but there would be one piece remaining. Of course we could sub-divide the left over piece into 4 pieces, but we're not going to do that. I'm eating any remaining pepperoni - problem solved! Just don't tell them!

Before moving on, I need to take care of a few things:

1. Disclaimer 1: While I have taken a number of math classes, I am by no means a mathematician! Please cut me some slack on the definitions.
2. Disclaimer 2: I used Excel 2007. Earlier versions of Excel may or may not support this.
3. Personal Note: To Mr. Smith, my 9th grade Algebra teacher at Bedford High School, Bedford, Massachusetts: "See, I was too paying attention!"

OK, where was I....

Oh yeah, the Modulus.

Let's see how the Modulus function can aid our testing. We're going to use it to determine if a given row number in our spreadsheet is odd or even.

So what is the Modulus? Simply stated, the Modulus is the remainder from a division operation. The MOD function in Excel will return the Modulus. For example:

5 divided by 3 ($5/3$) yields an answer of 1 with a remainder of 2 (1, remainder 2, or a decimal 1.6667)

6 divided by 3 (6/3) yields an answer of 2 with a remainder of 0 (2, remainder 0, or a decimal 2.0000)

The Modulus is the remainder. So, in the examples above, the Modulus of 5 and 3 is 2, and the Modulus of 6 and 3 is 0. Notice the Modulus is only concerned with the value of the remainder. It provides no information about the integer, or digits to the left of the decimal point. For some test efforts we don't really care about the actual value of the Modulus. We're typically only concerned that the Modulus is equal to zero or not equal to zero. Is there a remainder or not? Notice that if the target (pizza) is divided evenly by the divisor, the Modulus = 0 otherwise the Modulus <> 0. In the table below we will divided the row number by the column number (so ½ is 0.5000, 0 with a remainder of 1, therefore the modulus is 1). See for yourself:

Modulus (MOD) Function

	2		3		4		5	
	Quotient	MOD(x,y)	Quotient	MOD(x,y)	Quotient	MOD(x,y)	Quotient	MOD(x,y)
1	0.5000	1	0.3333	1	0.2500	1	0.2000	1
2	1.0000	0	0.6667	2	0.5000	2	0.4000	2
3	1.5000	1	1.0000	0	0.7500	3	0.6000	3
4	2.0000	0	1.3333	1	1.0000	0	0.8000	4
5	2.5000	1	1.6667	2	1.2500	1	1.0000	0
6	3.0000	0	2.0000	0	1.5000	2	1.2000	1
7	3.5000	1	2.3333	1	1.7500	3	1.4000	2
8	4.0000	0	2.6667	2	2.0000	0	1.6000	3
9	4.5000	1	3.0000	0	2.2500	1	1.8000	4
10	5.0000	0	3.3333	1	2.5000	2	2.0000	0
11	5.5000	1	3.6667	2	2.7500	3	2.2000	1
12	6.0000	0	4.0000	0	3.0000	0	2.4000	2
13	6.5000	1	4.3333	1	3.2500	1	2.6000	3
14	7.0000	0	4.6667	2	3.5000	2	2.8000	4
15	7.5000	1	5.0000	0	3.7500	3	3.0000	0
16	8.0000	0	5.3333	1	4.0000	0	3.2000	1
17	8.5000	1	5.6667	2	4.2500	1	3.4000	2
18	9.0000	0	6.0000	0	4.5000	2	3.6000	3
19	9.5000	1	6.3333	1	4.7500	3	3.8000	4
20	10.0000	0	6.6667	2	5.0000	0	4.0000	0

Using the MOD function in Microsoft Excel

To take advantage of the Modulus in Excel, we will use Excel's MOD function.

The MOD function: =MOD(Target,Divisor)

Again, going back to our first example we would enter the function as “=MOD(5,3)”. The result will be displayed in the cell as 2. Go ahead - try it out.

So how can we use this in testing? Let's look at a typical example.

Shading Alternate Rows

If you're like me and become somewhat vision impaired as the day drags on, validating row upon row of data in a report or on a large spreadsheet can be a challenge. I used to print out the report and use a ruler to analyze the data row by row. The ruler helped to keep me from drifting to a row above or below the target row as I scanned across the page. If it was a big report it was a long, boring, tedious task. When I was looking at it on the screen, instead of the printed page, it was even easier to drift off, especially if scrolling was involved (and harder to use the ruler). There had to be a better way!

One way to avoid drifting off of the row is to use alternate row shading. You essentially change the background color of every other row to help your eyes stay on the desired row. Although helpful, it is also time consuming to reformat the spreadsheet and manually change the background color of every other row. If you have to insert or delete a row, the entire spreadsheet has to be reformatted. Great idea – but how can we use it more efficiently? (Note: Yes, we can use the "Styles" that come with Excel to do the exact same thing we are about to do - and it's much easier. However, this is just a simple example that I will build upon at a later time.)

We're going to use two Excel features: the MOD function and Conditional Formatting. If a row number is even we'll have Excel change the background color of the row, if the row number is odd, we won't change the color. The MOD function will determine if a row is odd or even, and Conditional Formatting will change the row's background color if needed.

Our Test Scenario: We are testing a simple postal/shipping web application that requires the user to select a state when entering the delivery address. To avoid potential errors, the application requires the user to select a state from a drop-down list (or list-box). The state's valid postal service abbreviation will then be added to the address. We will use a list-box rather than entering data into a text box to reduce the chance of user error (an excellent development practice by the way). Our test needs to validate that the state abbreviations are valid and lists all 50 states (for simplicity, we won't use Guam or Puerto Rico, etc. and confine our list to the 50 US states).

Step 1 - Obtain a list of valid states and abbreviations to use as a reference and enter or paste the list into a new spreadsheet. The US Postal Service Web site is a good source. That's where I found the list below. It also includes the state capital, but we won't be using that for this test. Feel free to delete the column if you like. I highly recommend sorting the list alphabetically by state. We'll call this the "Reference" list.

<u>State</u>	<u>Abbreviation</u>	<u>Capital</u>
Alabama	AL	Montgomery
Alaska	AK	Juneau
Arizona	AZ	Phoenix
Arkansas	AR	Little Rock

California	CA	Sacramento
Colorado	CO	Denver
Connecticut	CT	Hartford
Delaware	DE	Dover
Florida	FL	Tallahassee
Georgia	GE	Atlanta
Hawaii	HI	Honolulu
Idaho	ID	Boise
Illinois	IL	Springfield
Indiana	IN	Indianapolis
Iowa	IA	Des Moines
Kansas	KS	Topeka
Kentucky	KY	Frankfort
Louisiana	LA	Baton Rouge
Maine	ME	Augusta
Maryland	MD	Annapolis
Massachusetts	MA	Boston
Michigan	MI	Lansing
Minnesota	MN	St. Paul
Mississippi	MS	Jackson
Missouri	MO	Jefferson City
Montana	MT	Helena
Nebraska	NB	Lincoln
Nevada	NV	Carson City
New Hampshire	NH	Concord
New Jersey	NJ	Trenton
New Mexico	NM	Santa Fe
New York	NY	Albany
North Carolina	NC	Raleigh
North Dakota	ND	Bismarck
Ohio	OH	Columbus
Oklahoma	OK	Oklahoma City
Oregon	OR	Salem
Pennsylvania	PA	Harrisburg
Rhode Island	RI	Providence
South Carolina	SC	Columbia
South Dakota	SD	Pierre
Tennessee	TN	Nashville
Texas	TX	Austin
Utah	UT	Salt Lake City
Vermont	VT	Montpelier
Virginia	VA	Richmond
Washington	WA	Olympia

West Virginia	WV	Charleston
Wisconsin	WI	Madison
Wyoming	WY	Cheyenne

Step 2 - Paste the list of states you are testing (the source of data in the drop-down list - usually stored in a database table, but it may be hard-coded) in the column(s) next to the reference list. I'd also recommend sorting this list as you did with the Reference list. We'll call this list the "Test" list.

Now at this point, with the two lists side-by-side, you could manually compare the two lists. Simply scan across the columns and make sure the two lists match. In this case, it's a relatively small list, and easily validated manually. But what if you were validating 1,000 account numbers instead?

To make the validation a little more error proof and our lives a little easier, we'll add background shading to every other row.

Step 1 - Determine if the row number is odd or even. This is where we put the MOD function to work. The function will check the current row number and divide it by 2. If the row number is even, the MOD function will return a zero (no remainder), otherwise, it will return a one. Here's the function...

`=MOD(ROW(),2)=0` (Where Row() will be the current row number, 2 is the divisor)

We'll use this function in our conditional formatting. Basically, if the MOD function returns a 0, the row is even and we'll have Excel apply background shading, otherwise we will leave the background white.

Step 1 - Select all the rows and columns of data in our spreadsheet that we want to format

Step 2 - Click on the Conditional Formatting button on your Excel Home tab

Step 3 - Click the "New Rule" option from the drop-down list

Step 4 - Select "Use a formula to determine which rows to format" option under "Select a rule type:"

Step 5 - Enter the Modulus formula above (`=MOD(ROW(),2)=0`) in the "Format values where this formula is true:" box

Step 6 - Click the "Format" button

Step 7 - Click the "Fill" tab

Step 8 - Select a background color from the "Background Color" palette. Personally I prefer light gray if I intend to print the list. (Notice your selection appears in the "Sample" box)

Step 9 - Click "OK" – You should now see a preview of your selected formatting.

Step 10 - Click "OK" – Notice your list when the dialog box closes. All of the even rows should now have your selected background color. If you don't like the color, repeat the above steps and select a different one.

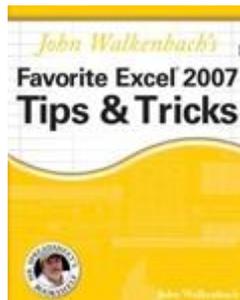
<u>State</u>	<u>Abbreviation</u>	<u>Capital</u>
Alabama	AL	Montgomery
Alaska	AK	Juneau
Arizona	AZ	Phoenix
Arkansas	AR	Little Rock
California	CA	Sacramento
Colorado	CO	Denver
Connecticut	CT	Hartford
Delaware	DE	Dover
Florida	FL	Tallahassee
Georgia	GE	Atlanta
Hawaii	HI	Honolulu
Idaho	ID	Boise
Illinois	IL	Springfield
Indiana	IN	Indianapolis
Iowa	IA	Des Moines
Kansas	KS	Topeka
Kentucky	KY	Frankfort
Louisiana	LA	Baton Rouge
Maine	ME	Augusta
Maryland	MD	Annapolis
Massachusetts	MA	Boston
Michigan	MI	Lansing
Minnesota	MN	St. Paul
Mississippi	MS	Jackson
Missouri	MO	Jefferson City
Montana	MT	Helena
Nebraska	NB	Lincoln
Nevada	NV	Carson City
New Hampshire	NH	Concord
New Jersey	NJ	Trenton
New Mexico	NM	Santa Fe
New York	NY	Albany
North Carolina	NC	Raleigh
North Dakota	ND	Bismarck
Ohio	OH	Columbus
Oklahoma	OK	Oklahoma City
Oregon	OR	Salem
Pennsylvania	PA	Harrisburg

Rhode Island	RI	Providence
South Carolina	SC	Columbia
South Dakota	SD	Pierre
Tennessee	TN	Nashville
Texas	TX	Austin
Utah	UT	Salt Lake City
Vermont	VT	Montpelier
Virginia	VA	Richmond
Washington	WA	Olympia
West Virginia	WV	Charleston
Wisconsin	WI	Madison
Wyoming	WY	Cheyenne

That's it. A few minutes work to improve a potentially tedious task! If it is something you will probably repeat often, save the process as a macro. That's what I did. Now, show your boss and co-workers what you have done. They will think you are – as we say in Massachusetts – “Wicked Smaht!”

As much as I'd like to take full credit for this – I can't. This entire procedure is actually available in the Excel Help utility. Click on the Help button and search for “Alternate Row Shading”.

Another great source of Excel information is “The Spreadsheet Page” (<http://spreadsheetpage.com>), a blog created and maintained by John Walkenbach. His blog is full of useful Excel tips and tricks. He is also the author of a number of Excel books. I highly recommend his book: “Favorite Excel 2007 Tips and Tricks”. It is by far the most used, and most borrowed, book on my bookshelf.



Stay tuned for Part 2 – Comparing two lists.