Lecture Note #10: Conditional Formatting Part #1

BUSI 201: Business Data Analysis

Fall 2023

Topic 1. Conditional Formatting

Conditional formatting can be a powerful tool that can be used in initial rounds of data analysis, and also to produce a table that would be easier to read. Conditional formatting allows the user to alter the formatting of certain cells in the spreadsheet if certain conditions are met.

The range of conditions that the user can set is quite flexible, and the formatting options are similarly flexible. For instance, the user can change the background color of cells that include values that are among the top 10% of cells in a table. Or the user can change the font and font color of cells that have values that are less than or equal to the sample average.

This function can be accessed by navigating to <u>Home</u> > <u>Conditional Formatting</u> as displayed in Figure 1, and has various types of rules that we can apply. We will be covering four different types of conditional formatting options in this lecture: Highlighting Cell Rules, Top/Bottom Rules, Data Bars, and Icon Sets.

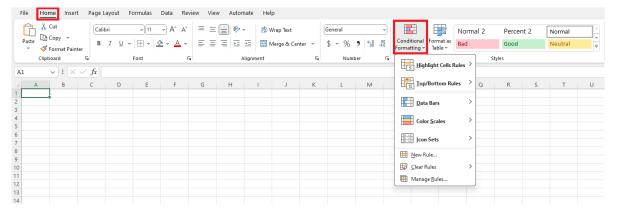


Figure 1: Conditional Formatting

Topic 2. Conditional Formatting: Greater Than...

Navigate to worksheet LAW in the workbook BUSI201-LEC10-Workbook.xlsx. This worksheet contains synthetic data on 26 applications received from a Law School. The data (B4:G30) includes the variables Applicant ID, LSAT, GPA, References, Statements, Experiences. Suppose that you are the administrative staff responsible of organizing this data according to the rules (I2:L30).

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5	CL-20230001	146	3.88	8.3	3.4	6.9		From	То	Verdict	Format
6	CL-20230002	180	3.22	7.8	3.3	7.2		170	180	Excellent	Score
7	CL-20230003	152	3.47	1.8	1.3	9.1		155	169	Satisfactory	Score
8	CL-20230004	154	3.4	9.5	7.4	9.6		145	154	Poor	Score
9	CL-20230005	149	3.61	8.5	1.6	2.3		0	144	Rejection	Score
10	CL-20230006	175	3.17	6.2	6.1	9.6					
11	CL-20230007	180	2.28	3.8	4	6.9				GPA	
12	CL-20230008	176	4.25	7.2	1.7	9.3		From	То	Verdict	Format
13	CL-20230009	158	3.64	9.1	2.1	4.2		3.7	4.3	Excellent	Score
14	CL-20230010	162	3.74	4	9.6	8.3		3.3	3.69	Satisfactory	Score
15	CL-20230011	176	4.12	7.1	2.9	2.1		3	3.29	Poor	Score
16	CL-20230012	167	4.14	9.8	7.4	10		0	2.99	Rejection	Score
17	CL-20230013	174	3.65	7.4	4.1	8.7					
18	CL-20230014	159	3.17	2.8	2	8.1			R	eferences	
19	CL-20230015	168	4.07	5.1	9.1	9		Crite	eria	Verdict	Format
20	CL-20230016	147	3.18	1.2	8.7	8.2		Тор	25%	Excellent	Score
21	CL-20230017	149	3.24	1.7	7.9	1.9		Top !	50%	Satisfactory	Score
22	CL-20230018	162	3.3	6.8	3	2.6		Top	75%	Poor	Score
23	CL-20230019	143	3.95	8.7	6.3	9.2		Botton	n 25%	Rejection	Score
24	CL-20230020	138	3.24	1.7	9.8	5.1					
25	CL-20230021	152	4.25	6	2.6	8.3			S	tatements	
26	CL-20230022	159	3.45	9	9.9	5.8		Crite	eria	Verdict	Format
27	CL-20230023	152	3.57	9.5	8.8	1.5		Тор	20%	Excellent	Score
28	CL-20230024	176	4.1	3.7	7.3	2		Top !	50%	Satisfactory	Score
29	CL-20230025	153	3.53	3	5.9	6.5		Top	80%	Poor	Score
30	CL-20230026	128	3.83	4.3	2.4	9.2		Botton	n 20%	Rejection	Score
31										•	

Figure 2: The LAW Sheet

Formatting: Understanding LSAT Score Rules

The rules for the LSAT scores are given as the first rule in 12:L30. If the applicant has an LSAT score greater than or equal to 170, they are classified as "Excellent," and the cells that stores their LSAT scores should have a green background, the font color should be white, and the text itself should be bolded.

Similarly, LSAT scores between 155 and 169 are classified as "Satisfactory," and the cells should have a light green background. Those between 145 and 154 are classified as "Poor," and have no special formatting. If the LSAT scores are lower than or equal to 144, this will trigger an automatic rejection, and the cells containing these scores should have a red background and white text color.

Formatting: Applying LSAT Score Rules

We will start off with the first conditional formatting task of marking the scores that are classified as "Excellent."

- 1. Start off by selecting the portion of the data that stores LSAT scores (excluding the row that contains the variable name) as displayed by the red box in Figure 3.
- 2. Then head to Home > Conditional Formatting and select Highlight Cells Rules then More Rules to call up the New Formatting Rule window.
- 3. In the New Formatting Rule window, change the "greater than" to "greater than or equal to" in the green box.
- 4. In the purple box, choose I5, which contains the value 170 in the evaluation criteria table.
- 5. Then click on the Format... button... (continued on the next page)

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28	CL-20230024	176	4.1	3.7	7.3	2	. Top 5		Satisfactory	Score		
29	CL-20230025	153	3.53	3	5.9	6.5	Top 8		Poor	Score		
10	CL-20230026	128	3.83	4.3	2.4	9.2	Bottom	1 20%	Rejection	Score		

Figure 3: Conditional Formatting: Excellent LSAT Part 1

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CL-20230023 152	3.57	9.5	8.8	1.5	Top 20%	Excellent	Score									
CL-20230024 176	4.1	3.7	7.3	2	Top 50%	Satisfactory	Score									
CL-20230025 153	3.53	3	5.9	6.5	Top 80%	Poor	Score									
CL-20230026 128	3.83	4.3	2.4	9.2	Bottom 209	6 Rejection	Score									

Figure 4: Conditional Formatting: Excellent LSAT Part 2

- 6. Under Fill, select a dark green background color for the cells with 170+ LSAT scores.
- 7. Under Font, select the bold text style, and white text color.
- 8. Click on OK to check the final result.

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6	CL-20230002	180	3.22	7.8	3.3	7.2	1	70 180	Excellent	Score
7	CL-20230003	152	3.47	1.8	1.3	9.1	1	55 169	Satisfactory	Score
3	CL-20230004	154	3.4	9.5	7.4	9.6	1-	45 154	Poor	Score
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12	CL-20230008	176	4.25	7.2	1.7	9.3	Fre	om To	Verdict	Format
3	CL-20230009	158	3.64	9.1	2.1	4.2	3	.7 4.3	Excellent	Score
4	CL-20230010	162	3.74	4	9.6	8.3	3	.3 3.69	Satisfactory	Score
5	CL-20230011	176	4.12	7.1	2.9	2.1		3 3.29	Poor	Score
6	CL-20230012	167	4.14	9.8	7.4	10		0 2.99	Rejection	Score
7	CL-20230013	174	3.65	7.4	4.1	8.7				
8	CL-20230014	159	3.17	2.8	2	8.1		F	References	
9	CL-20230015	168	4.07	5.1	9.1	9		Criteria	Verdict	Format
20	CL-20230016	147	3.18	1.2	8.7	8.2		Top 25%	Excellent	Score
1	CL-20230017	149	3.24	1.7	7.9	1.9		Top 50%	Satisfactory	Score
22	CL-20230018	162	3.3	6.8	3	2.6		Top 75%	Poor	Score
23	CL-20230019	143	3.95	8.7	6.3	9.2	Bo	ottom 25%	Rejection	Score
24	CL-20230020	138	3.24	1.7	9.8	5.1				
25	CL-20230021	152	4.25	6	2.6	8.3		S	tatements	
26	CL-20230022	159	3.45	9	9.9	5.8	_	Criteria	Verdict	Format
27	CL-20230023	152	3.57	9.5	8.8	1.5		Top 20%	Excellent	Score
28	CL-20230024	176	4.1	3.7	7.3	2		Top 50%	Satisfactory	Score
9	CL-20230025	153	3.53	3	5.9	6.5		Top 80%	Poor	Score
0	CL-20230026	128	3.83	4.3	2.4	9.2	Bo	ottom 20%	Rejection	Score
1										

Figure 5: Conditional Formatting: Excellent LSAT Part 3

Detour: Editing Conditional Formatting

Although we do have the "Excellent" LSAT scores formatted, it is not exactly the format we wanted. The background seems to be a bit darker than what we were aiming for, depicted in cell L5 in Figure 5. We have two choices to deal with this situation; removing the conditional format and trying again, or editing the rules.

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7	CL-20230023	152	3.57	9.5	8.8	1.5		20%	Excellent	Score
8	CL-20230024	176	4.1	3.7	7.3	2		50%	Satisfactory	Score
9	CL-20230025	153	3.53	3	5.9	6.5	Тор	80%	Poor	Score
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0	CL-20230026	128	3.83	4.3	2.4	9.2	Botto	m 20%	Rejection	Score

Figure 6: Conditional Formatting: Editing and Removing

Select the LSAT scores, and navigate to Conditional Formatting > Manage Rules. Then we can either delete the rule and start over by selecting the rule we have and clicking Delete Rule, or selecting the rule that we have and clicking Edit Rule. Clicking Edit Rule will bring you back to Figure 4, where you can adjust the background color to fit the desired format.

Topic 3. Conditional Formatting: Between...

Now we have the "Excellent" scores formatted, we must work with the "Satisfactory" scores which are scores between 155 to 169. Follow the instructions below to set up the conditional formatting for the "Satisfactory" LSAT scores in the dataset.

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16	CL-20230011	176	4.12	7.1 9.8	2.9 7.4	2.1									
17	CL-20230012 CL-20230013	167 174	4.14	9.8 7.4	7.4 4.1	10 8.7									
18	CL-20230013	174	3.17	2.8	4.1	8.1									
19	CL-20230014	168	4.07	5.1	9.1	9									
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22	CL-20230018	162	3.3	6.8	3	2.6	-								
23	CL-20230019	143	3.95	8.7	6.3	9.2	-								
24	CL-20230020	138	3.24	1.7	9.8	5.1		Sample							
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30	CL-20230026	128	3.83	4.3	2.4	9.2							ОК	Can	cel

Figure 7: Between Two Values

- 1. Select the LSAT scores C5:C30, and
- 2. Select **Between** in the dropdown menu from Conditional Formatting.
- 3. Set up the lower and upper bounds in the popup Between window.
- 4. Select Custom Format.
- 5. Set up the desired format for the "Satisfactory" LSAT scores in the Format Cells window.

Topic 4. Conditional Formatting: Less than...

Now we have the "Excellent" and "Satisfactory" scores formatted, we must work with the last classification of "Rejection" scores which are scores less than or equal to 144. Following the steps listed below, we can finish formatting LSAT scores.

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	CL-20230003	152	3.47	1.8	1.3	9.1	155	169	Clear Ru		>	A Date C)ccurring
	CL-20230004	154	3.4	9.5	7.4	9.6	145	154				<u>D</u> uplicat	e Values
	CL-20230005	149	3.61	8.5	1.6	2.3	0	144	III Manage	e <u>R</u> ules	_	<u> </u>	
	CL-20230006		3.17	6.2	6.1	9.6					_	More Rules	
	CL-20230007		2.28	3.8	4	6.9			GPA		_	_	
	CL-20230008	176	4.25	7.2	1.7	S New For	matting Rule						?
	CL-20230009	158	3.64	9.1	2.1	4 Select a R	ule Type:						
	CL-20230010	162 176	3.74 4.12	4 7.1	9.6 2.9	Forma	at all cells based o	on their values					
	CL-20230011 CL-20230012	1/6	4.12	7.1 9.8	2.9 7.4		at only cells that o						
	CL-20230012 CL-20230013	107	3.65	7.4	4.1		at only top or bot at only values that						
	CL-20230014	159	3.17	2.8	2	Forma	at only unique or o	duplicate values					
	CL-20230015	168	4.07	5.1	9.1	Use a	formula to deter	nine which cells	to format				
	CL-20230016	147	3.18	1.2	8.7	Edit the R	ule Description:						
1	CL-20230017	149	3.24	1.7	7.9	1 Format	only cells with:						
	CL-20230018	162	3.3	6.8	3	2 Cell Val		ess than or equ	al to 🖂 =\$	J\$9			(
	CL-20230019	143	3.95	8.7	6.3	<u>c</u>		etween ot between					
	CL-20230020	138	3.24	1.7	9.8	5		qual to ot equal to					Format
	CL-20230021	152	4.25	6	2.6	8 Preview		reater than ess than	CeY	Y22			Eormat
	CL-20230022	159	3.45	9	9.9	5	2	reater than or e ess than or equi				ОК	Cancel
	CL-20230023	152	3.57	9.5	8.8	1			Enconome				
	CL-20230024	176	4.1	3.7	7.3	2		op 50%	Satisfactor				
	CL-20230025	153	3.53	3	5.9	6.5		op 80%	Poor	Score			
	CL-20230026	128	3.83	4.3	2.4	9.2	Bot	tom 20%	Rejection	Score	e		

Figure 8: Less than or Equal to

- 1. Select the LSAT scores C5:C30, and
- 2. Select More Rules in the dropdown menu from Conditional Formatting.
- 3. Select less than or equal to in the dropdown.
- 4. Set up the threshold points in the orange box.
- 5. Set up the desired format for the "Rejection" LSAT scores by clicking the Format button.

Topic 5. Conditional Formatting: Bottom/Top Values

Scores for the references, statements, and experiences are graded relatively to the pool of applicants. Therefore, the top few applicants will be granted "Excellent" classification, the next few will be given "Satisfactory," and so forth... We will be using conditional formatting with top/bottom rules to acheive this task.

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	CL-20230004	154	3.4	9.5	7.4	9.6	145	154	Clear Rules		/	Below Average	
	CL-20230005	149	3.61	8.5	1.6	2.3	0	144	Manage Ru	ıles		<u>x</u> secondension	_
	CL-20230006	175	3.17	6.2	6.1	9.6					_	More Rules	
	CL-20230007	180	2.28	3.8	4	6.9			GPA				_
	CL-20230008	176	4.25	7.2	1.7		From	To	Mardist	Format	•	? >	×
	CL-20230009	158	3.64	9.1	2.1	New Formatti	ng Kule					£ 2	`
F.	CL-20230010	162	3.74	4	9.6	Select a Rule Ty	pe:						
	CL-20230011	176	4.12	7.1	2.9		ells based on th						
	CL-20230012	167	4.14	9.8	7.4		cells that conta top or bottom						
	CL-20230013	174	3.65	7.4	4.1		values that are						
	CL-20230014	159	3.17	2.8	2		unique or dupl						
•	CL-20230015	168	4.07	5.1	9.1	► Use a formu	la to determine	which cells to	format				
	CL-20230016	147	3.18	1.2	8.7	Edit the Rule De	scription:						
	CL-20230017	149	3.24	1.7	7.9		that rank in t	he:					
	CL-20230018	162	3.3	6.8	3	Тор 🗸			he selected range				
	CL-20230019	143	3.95	8.7	6.3								
	CL-20230020	138	3.24	1.7	9.8								
	CL-20230021	152	4.25	6	2.6	Preview:						Eormat	וו
	CL-20230022	159	3.45	9	9.9								
	CL-20230023	152	3.57	9.5	8.8							OK Cancel	Ц,
	CL-20230024	176	4.1	3.7	7.3	2		50%	Satisfactory	Score			
	CL-20230025	153	3.53	3	5.9	6.5		80%	Poor	Score	_		
1	CL-20230026	128	3.83	4.3	2.4	9.2	Botto	m 20%	Rejection	Score			

Figure 9: Top 25% in References

To access conditions based on rank...

- 1. Select the Reference scores E5:E30, and
- 2. Select Top/Bottom Rules > More Rules in the dropdown menu from Conditional Formatting.
- 3. Select Top, Type in 25, and Check the "% of the selected range" in the dropdown.
- 4. Set up the desired format for the "Excellent" Reference scores by clicking the Format button.

The Ordering of Rules

We now move on to the "Satisfactory" category of reference scores. You can repeat the same process as the previous part, but typing in 50 instead of 25 in step 3. But you will immediately run into a problem as soon as you apply this conditional formatting as we can see in Figure 10.

A	В	С	D	E	F	G	H I	J	K	L
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3 4		10.17			<u>.</u>	<u> </u>	-		LSAT	
	Applicant ID CL-20230001	LSAT	GPA	References	Statements	Experiences 6.9	F	т.	Verdict	F
5		146	3.88	8.3	3.4		From	To		Format
6	CL-20230002	180	3.22	7.8	3.3	7.2	170	180	Excellent	Score
7	CL-20230003	152	3.47	1.8	1.3	9.1	155	169	Satisfactory	Score
8	CL-20230004	154	3.4	9.5	7.4	9.6	145	154	Poor	Score
9	CL-20230005	149	3.61	8.5	1.6	2.3	0	144	Rejection	Score
10	CL-20230006	175	3.17	6.2	6.1	9.6				
11	CL-20230007	180	2.28	3.8	4	6.9	_	_	GPA	_
12	CL-20230008	176	4.25	7.2	1.7	9.3	From	То	Verdict	Format
13	CL-20230009	158	3.64	9.1	2.1	4.2	3.7	4.3	Excellent	Score
14	CL-20230010	162	3.74	4	9.6	8.3	3.3	3.69	Satisfactory	Score
15	CL-20230011	176	4.12	7.1	2.9	2.1	3	3.29	Poor	Score
16	CL-20230012	167	4.14	9.8	7.4	10	0	2.99	Rejection	Score
17	CL-20230013	174	3.65	7.4	4.1	8.7				
18	CL-20230014	159	3.17	2.8	2	8.1		R	leferences	
19	CL-20230015	168	4.07	5.1	9.1	9	Crit	eria	Verdict	Format
20	CL-20230016	147	3.18	1.2	8.7	8.2	Тор	25%	Excellent	Score
21	CL-20230017	149	3.24	1.7	7.9	1.9	Тор	50%	Satisfactory	Score
22	CL-20230018	162	3.3	6.8	3	2.6	Тор	75%	Poor	Score
23	CL-20230019	143	3.95	8.7	6.3	9.2	Bottor	m 25%	Rejection	Score
24	CL-20230020	138	3.24	1.7	9.8	5.1				
25	CL-20230021	152	4.25	6	2.6	8.3		s	tatements	
26	CL-20230022	159	3.45	9	9.9	5.8	Crit	eria	Verdict	Format
27	CL-20230023	152	3.57	9.5	8.8	1.5	Тор	20%	Excellent	Score
28	CL-20230024	176	4.1	3.7	7.3	2	Тор	50%	Satisfactory	Score
29	CL-20230025	153	3.53	3	5.9	6.5	Тор	80%	Poor	Score
30	CL-20230026	128	3.83	4.3	2.4	9.2	Bottor		Rejection	Score

Figure 10: Formats Overwritten

To fix this issue, open up the conditional formatting rules manager following the steps in Figure 6. Then select the first rule to be applied in the red box, and move it up by clicking the button in the orange box in Figure 11.

ow formatting rules for: Cu	rrent Selection						
🖽 New Rule	Edit Rule X Dele	e Rule	Duplicate Rule	^	\sim		
ule (applied in order shown)		Format		App	olies to		Stop If True
Top 50%			AaBbCcYyZz	=\$E	\$5:\$E\$30	1	
Top 25%			AaBbCcYyZz	=\$E	\$5:\$E\$30	1	

Figure 11: Conditional Formatting Rules Manager

Using these rules, fill out the remaining conditional formatting tasks in sheet LAW.

Topic 6. Formatting the Entire Row when it Meets a Condition

Navigate over to the next worksheet PUSHUP, which has data on a push-up trial. There are four criteria that determines who of the 14 people "passed" the test. In the text, we will talk about the first condition. Those who completed a total of 130 push-ups across their three attemps passes the test. The first task is to use the SUM function to find the number of push-ups that the individuals completed. In the previous task, we applied formats to the individual cells separately; so their LSAT, GPA, References, etc were all allowed to have different formats depending on how they performed in each aspect. Here, we want to check one condition for each person, and apply the format to the entire row for individuals who passed the test.

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Participant	Attempt 1		unique or duplica						Color genes	of All A	Attempts			Fo	rmat	
PID-1	53	► Use a formu	la to determine w	hich cells to format					I con Sets	> mpts i	s less than or e	qual	1	PASSING C	ONTESTAI	NT
PID-2	27	Edit the Rule De	unintion:							hils, an	d must try aga	in.				
PID-3	47		where this form	unda la Annar					New Rule							
PID-4	41	=\$F5<130	where this form	in a la croe.			+		🔯 <u>C</u> lear Rules	> of All A	Attempts					
PID-5	46						-		Manage Bules	attem	pts is less than	or				
PID-6	62	1 _							equal to 45, the partic	ipant fails,	and must try a	gain.				
PID-7	44	Preview:		AaB	bCcYyZz		Eormat									
PID-8	62	i						1 -	Criteria 3: N	/lin of All A	ttempts					
PID-9	64	l				ОК	Cancel	17	If the lowest of all t	nree attem	pts is less than	or				
PID-10	51	42	58	151					equal to 30, the partic	ipant fails,	and must try a	gain.				
PID-11	52	51	48	151												
PID-12	35	54	77	166					Criteria 4: Gr	atest Two	Attempts					
PID-13	45	43	47	135					If the sum of the to	o two reco	rds is less than	or				
PID-14	33	37	55	125					equal to 90, the partic	inant faile	and must try a	rain				

Figure 12: Pass Criteria #1

- 1. Select the data including the newly calculated total sum, B5: F18.
- 2. Select New Rule in the dropdown menu from Conditional Formatting.
- 3. Select use a formula to determine which cells to format.
- 4. Type in the condition = F5>130.
- 5. Set up the desired format for the "Passing Push-ups" by clicking the Format button.

			Push-u	p Score	s			Evaluation Rules	
Participant	Attempt 1	Attempt 2	Attempt 3	Total	Highest	Lowest	Sum of Greatest Two	Criteria 1: Sum of All Attempts	Format
PID-1	53	43	51	147				If the sum of all three attempts is less than or equal	PASSING CONTESTANT
PID-2	27	43	35	105				to 130, the participant fails, and must try again.	
PID-3	47	47	44	138					
PID-4	41	41	40	122				Criteria 2: Max of All Attempts	
PID-5	46	45	38	129				If the highest of all three attempts is less than or	
PID-6	62	34	36	132				equal to 45, the participant fails, and must try again.	
PID-7	44	62	53	159					
PID-8	62	39	34	135				Criteria 3: Min of All Attempts	
PID-9	64	40	32	136				If the lowest of all three attempts is less than or	
PID-10	51	42	58	151				equal to 30, the participant fails, and must try again.	
PID-11	52	51	48	151					
PID-12	35	54	77	166				Criteria 4: Greatest Two Attempts	
PID-13	45	43	47	135				If the sum of the top two records is less than or	
PID-14	33	37	55	125				equal to 90, the participant fails, and must try again.	

Figure 13: Pass Criteria #1 Completed

Topic 7. Formatting the Entire Row when it Meets Many Conditions

Navigate over to the next worksheet TRIATHLON, which has data on a triathlon trial. We will learn how to format the entire row, while checking multiple conditions simultaneously. Suppose that we want to highlight the data entries for contestants that "passed" each element of the triathlon.

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6		CH3-002	Pass																	
7		CH3-003	Pass		Format only unique or duplicate values Use a formula to determine which cells to format											New Rule				
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9		CH3-005	Fail	Edit the Rule	Edit the Rule Description:											Manage <u>R</u> ules				
10		CH3-006	Pass	Format va	Format values where this formula is true:															
11		CH3-007	Pass	=AND(\$C5	=AND(\$C5="Pass",\$D5="Pass",\$E5="Pass")															
12		CH3-008	Pass																	
13		CH3-009	Pass	Preview:	A-PLC-W.Z															
14		CH3-010	Pass	Preview:	AaBbCcYyZz Eormat						mat									
15		CH3-011	Fail								0	ĸ		ancel	1					
16		CH3-012	Pass		,	1 435									Ĵ.					
17		CH3-013	Pass	Pas	6	Pass														
18		CH3-014	Fail	Pas	6	Pass														
19		CH3-015	Fail	Pas	6	Pass														
20							-													

Figure 14: Triathlon Pass Criteria

- 1. Select the data B5:E19.
- 2. Select New Rule under Conditional Formatting, and select "use a formula to determine which cells to format."
- 3. Type in the condition =AND (\$C5="Pass", \$D5="Pass", \$E5="Pass").
- 4. Set up the desired format.