

Lecture Note #09: Conditional Formatting Part #1

BUSI 201: Business Data Analysis

Spring 2024

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 **Home** > **Conditional Formatting** 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.

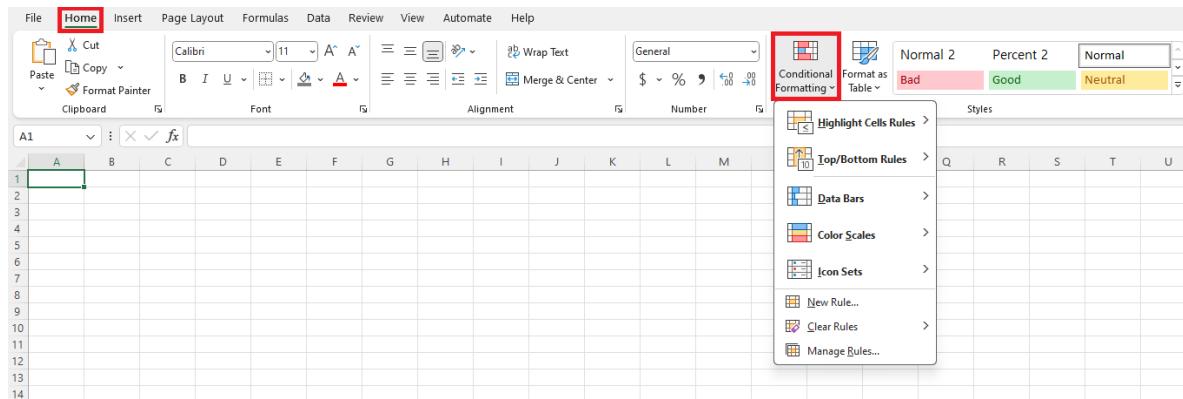


Figure 1: Conditional Formatting

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).

A	B	C	D	E	F	G	H	I	J	K	L
1											
LAW SCHOOL APPLICATION EVALUATIONS											
EVALUATION RULES											
4	Applicant ID	LSAT	GPA	References	Statements	Experiences					
5	CL-20230001	146	3.88	8.3	3.4	6.9					
6	CL-20230002	180	3.22	7.8	3.3	7.2					
7	CL-20230003	152	3.47	1.8	1.3	9.1					
8	CL-20230004	154	3.4	9.5	7.4	9.6					
9	CL-20230005	149	3.61	8.5	1.6	2.3					
10	CL-20230006	175	3.17	6.2	6.1	9.6					
11	CL-20230007	180	2.28	3.8	4	6.9					
12	CL-20230008	176	4.25	7.2	1.7	9.3					
13	CL-20230009	158	3.64	9.1	2.1	4.2					
14	CL-20230010	162	3.74	4	9.6	8.3					
15	CL-20230011	176	4.12	7.1	2.9	2.1					
16	CL-20230012	167	4.14	9.8	7.4	10					
17	CL-20230013	174	3.65	7.4	4.1	8.7					
18	CL-20230014	159	3.17	2.8	2	8.1					
19	CL-20230015	168	4.07	5.1	9.1	9					
20	CL-20230016	147	3.18	1.2	8.7	8.2					
21	CL-20230017	149	3.24	1.7	7.9	1.9					
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					
25	CL-20230021	152	4.25	6	2.6	8.3					
26	CL-20230022	159	3.45	9	9.9	5.8					
27	CL-20230023	152	3.57	9.5	8.8	1.5					
28	CL-20230024	176	4.1	3.7	7.3	2					
29	CL-20230025	153	3.53	3	5.9	6.5					
30	CL-20230026	128	3.83	4.3	2.4	9.2					
31											

Figure 2: The LAW Sheet

Formatting: Understanding LSAT Score Rules

The rules for the LSAT scores are given as the first rule in I2: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)

The screenshot shows a Microsoft Excel spreadsheet titled "LAW SCHOOL APPLICATION EVALUATIONS". The data includes columns for Applicant ID, LSAT, GPA, References, Statements, Experiences, and Evaluation. A red box highlights the LSAT column from row 5 to 30. The Conditional Formatting ribbon tab is selected, and the "Highlight Cells Rules" option is chosen. The "Greater Than..." rule is selected, and the "Format..." button is highlighted in orange. The "Format" dialog box is open, showing the "Score" color swatch for the "Excellent" verdict. The "Format Only Cells Based On Their Values" checkbox is checked. The "Cell Value" dropdown is set to "greater than or equal to", and the "Format Set" dropdown shows the "Score" color swatch. The "OK" button is visible at the bottom of the dialog.

Figure 3: Conditional Formatting: Excellent LSAT Part 1

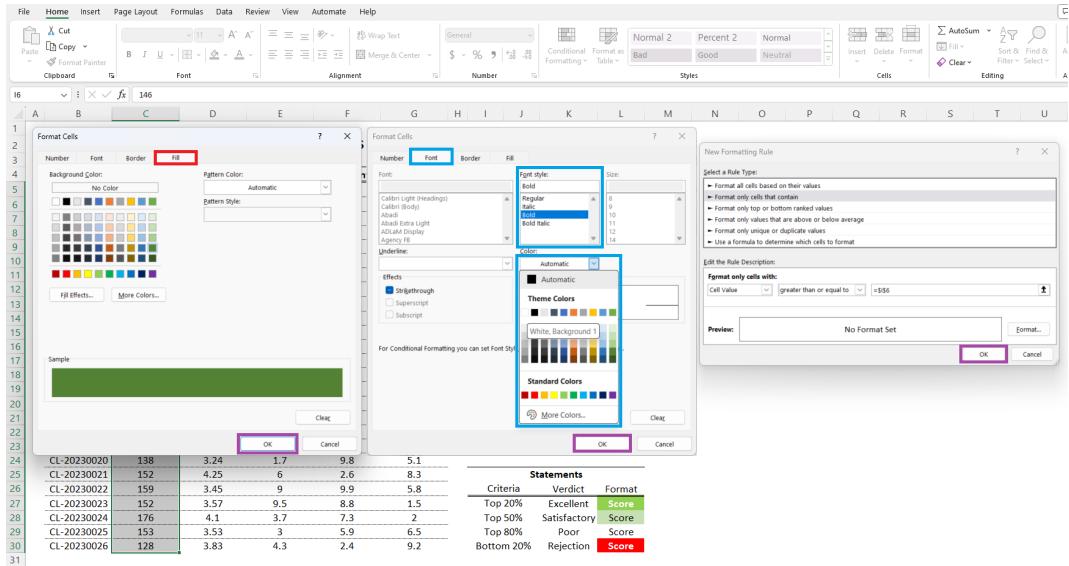


Figure 4: Conditional Formatting: Excellent LSAT Part 2

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.

LAW SCHOOL APPLICATION EVALUATIONS						EVALUATION RULES			
Applicant ID	LSAT	GPA	References	Statements	Experiences				
CL-20230001	146	3.88	8.3	3.4	6.9				
CL-20230002	152	4.25	6	2.6	8.3				
CL-20230003	159	3.45	0	0.0	5.8				
CL-20230004	154	3.4	9.5	7.4	9.6				
CL-20230005	149	3.61	8.5	1.6	2.3				
CL-20230006	175	3.17	6.2	6.1	9.6				
CL-20230007	180	2.28	3.8	4	6.9				
CL-20230008	176	4.25	7.2	1.7	9.3				
CL-20230009	158	3.64	9.1	2.1	4.2				
CL-20230010	162	3.74	4	9.6	8.3				
CL-20230011	176	4.12	7.1	2.9	2.1				
CL-20230012	167	4.14	9.8	7.4	10				
CL-20230013	174	3.65	7.4	4.1	8.7				
CL-20230014	159	3.17	2.8	2	8.1				
CL-20230015	168	4.07	5.1	9.1	9				
CL-20230016	147	3.18	1.2	8.7	8.2				
CL-20230017	149	3.24	1.7	7.9	1.9				
CL-20230018	162	3.3	6.8	3	2.6				
CL-20230019	143	3.95	8.7	6.3	9.2				
CL-20230020	138	3.24	1.7	9.8	5.1				
CL-20230021	152	4.25	6	2.6	8.3				
CL-20230022	159	3.45	9	9.9	5.8				
CL-20230023	152	3.57	9.5	8.8	1.5				
CL-20230024	176	4.1	3.7	7.3	2				
CL-20230025	153	3.53	3	5.9	6.5				
CL-20230026	128	3.83	4.3	2.4	9.2				

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.

The screenshot shows a Microsoft Excel spreadsheet titled "LAW SCHOOL APPLICATION EVALUATIONS". The data includes columns for Applicant ID, LSAT, GPA, References, Statements, and Experiences. A conditional format is applied to the LSAT column (C5:C30) where values are greater than or equal to 156, changing the background color to green. The "Conditional Formatting" dropdown on the Home tab is open, and the "Manage Rules..." option is highlighted with a red box. A separate "Conditional Formatting Rules Manager" dialog box is also visible, with the "Edit Rule..." button highlighted with a blue box.

Applicant ID	LSAT	GPA	References	Statements	Experiences
CL-20230001	146	3.88	8.3	3.4	6.9
CL-20230002	180	3.22	7.8	3.3	7.2
CL-20230003	152	3.47	1.8	1.3	9.1
CL-20230004	154	3.4	9.5	7.4	9.6
CL-20230005	149	3.61	8.5	1.6	2.3
CL-20230006	175	3.17	6.2	6.1	9.6
CL-20230007	180				
CL-20230008	156				
CL-20230009	156				
CL-20230010	160				
CL-20230011	160				
CL-20230012	160				
CL-20230013	170				
CL-20230014	155				
CL-20230015	160				
CL-20230016	140				
CL-20230017	140				
CL-20230018	160				
CL-20230019	140				
CL-20230020	138	3.24	1.7	9.8	5.1
CL-20230021	152	4.25	6	2.6	8.3
CL-20230022	159	3.45	9	9.9	5.8
CL-20230023	152	3.57	9.5	8.8	1.5
CL-20230024	176	4.1	3.7	7.3	2
CL-20230025	153	3.53	3	5.9	6.5
CL-20230026	128	3.83	4.3	2.4	9.2

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.

The screenshot shows a Microsoft Excel spreadsheet titled "LAW SCHOOL APPLICATION EVALUATIONS". The data is organized into columns: "Applicant ID", "LSAT", "EVALUATOR", and "Score". The "LSAT" column contains values ranging from 146 to 175. A conditional formatting rule is being applied to the range C5:C30. The "Format Cells" dialog box is open, and the "Between" option is selected under the "Highlight Cells Rules" section. The "From" value is set to 170 and the "To" value is set to 180. The "Format" dropdown menu is open, showing various color and border options. The "Format Cells" dialog box also shows the "Fill" tab selected, with a preview of the light red fill and dark red text. The "OK" button is visible at the bottom right of the dialog box.

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.

The screenshot shows a Microsoft Excel spreadsheet titled "LAW SCHOOL APPLICATION EVALUATIONS". The data includes columns for Applicant ID, LSAT, GPA, References, Statements, Experiences, and Evaluation. The "Evaluation" column contains three categories: Top 50% (Satisfactory), Top 80% (Poor), and Bottom 20% (Rejection). The "GPA" column is selected, and the "Conditional Formatting" dropdown menu is open, showing various rules like "Highlight Cells Rules", "Top/Bottom Rules", and "Less Than...". A red box highlights the "Less Than..." option under "Top/Bottom Rules". The "Format only cells that contain" dropdown is set to "less than or equal to" and the threshold value is set to "\$144". The "Format" button is visible at the bottom right of the dialog.

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 achieve this task.

The screenshot shows a Microsoft Excel spreadsheet titled "LAW SCHOOL APPLICATION EVALUATIONS". The data includes columns for Applicant ID, LSAT, GPA, References, Statements, and Experiences. The "References" column is selected. The ribbon shows the "Home" tab is active. In the "Conditional Formatting" section of the ribbon, the "Top/Bottom Rules" option is highlighted with a red box. A dropdown menu for "Top/Bottom Rules" is open, also highlighted with a red box. It contains options like "Top 10 Items...", "Top 10 %...", "Bottom 10 Items...", "Bottom 10 %...", "Above Average...", and "Below Average...". Below this, a "More Rules..." option is also highlighted with a red box. A "New Formatting Rule" dialog box is open over the spreadsheet. It has sections for "Select a Rule Type:" (with "Format only top or bottom ranked values" checked), "Edit the Rule Description:" (with "Format values that rank in the:" dropdown set to "Top" and "25" entered, and a checkbox for "% of the selected range" checked), and a "Preview" section showing a green row with the text "AaBbCcYyZz" and the word "Score" in green. The "Format..." button in the preview section is also highlighted with a red box. At the bottom of the dialog box are "OK" and "Cancel" buttons.

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.

LAW SCHOOL APPLICATION EVALUATIONS

Applicant ID	LSAT	GPA	References	Statements	Experiences
CL-20230001	146	3.88	8.3	3.4	6.9
CL-20230002	180	3.22	7.8	3.3	7.2
CL-20230003	152	3.47	1.8	1.3	9.1
CL-20230004	154	3.4	9.5	7.4	9.6
CL-20230005	149	3.61	8.5	1.6	2.3
CL-20230006	175	3.17	6.2	6.1	9.6
CL-20230007	180	2.28	3.8	4	6.9
CL-20230008	176	4.25	7.2	1.7	9.3
CL-20230009	158	3.64	9.1	2.1	4.2
CL-20230010	162	3.74	4	9.6	8.3
CL-20230011	176	4.12	7.1	2.9	2.1
CL-20230012	167	4.14	9.8	7.4	10
CL-20230013	174	3.65	7.4	4.1	8.7
CL-20230014	159	3.17	2.8	2	8.1
CL-20230015	168	4.07	5.1	9.1	9
CL-20230016	147	3.18	1.2	8.7	8.2
CL-20230017	149	3.24	1.7	7.9	1.9
CL-20230018	162	3.3	6.8	3	2.6
CL-20230019	143	3.95	8.7	6.3	9.2
CL-20230020	138	3.24	1.7	9.8	5.1
CL-20230021	152	4.25	6	2.6	8.3
CL-20230022	159	3.45	9	9.9	5.8
CL-20230023	152	3.57	9.5	8.8	1.5
CL-20230024	176	4.1	3.7	7.3	2
CL-20230025	153	3.53	3	5.9	6.5
CL-20230026	128	3.83	4.3	2.4	9.2

EVALUATION RULES

LSAT			
From	To	Verdict	Format
170	180	Excellent	Score
155	169	Satisfactory	Score
145	154	Poor	Score
0	144	Rejection	Score

GPA			
From	To	Verdict	Format
3.7	4.3	Excellent	Score
3.3	3.69	Satisfactory	Score
3	3.29	Poor	Score
0	2.99	Rejection	Score

References			
Criteria	Verdict	Format	
Top 25%	Excellent	Score	
Top 50%	Satisfactory	Score	
Top 75%	Poor	Score	
Bottom 25%	Rejection	Score	

Statements			
Criteria	Verdict	Format	
Top 20%	Excellent	Score	
Top 50%	Satisfactory	Score	
Top 80%	Poor	Score	
Bottom 20%	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.

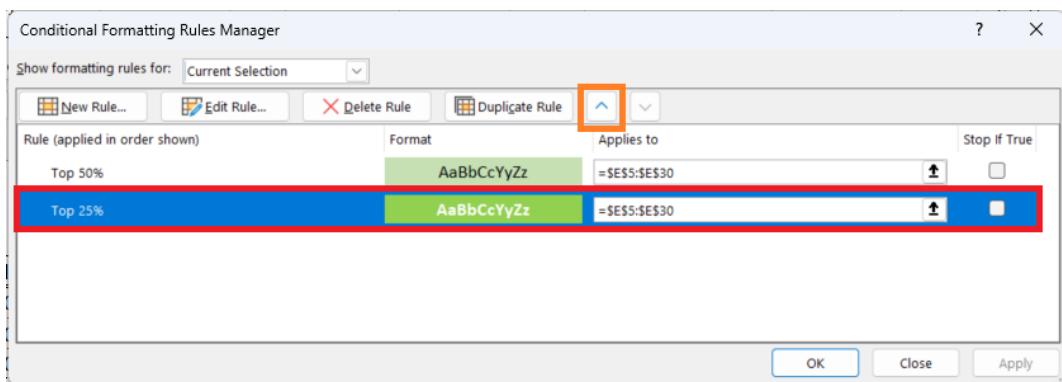


Figure 11: Conditional Formatting Rules Manager

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 attempts 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.

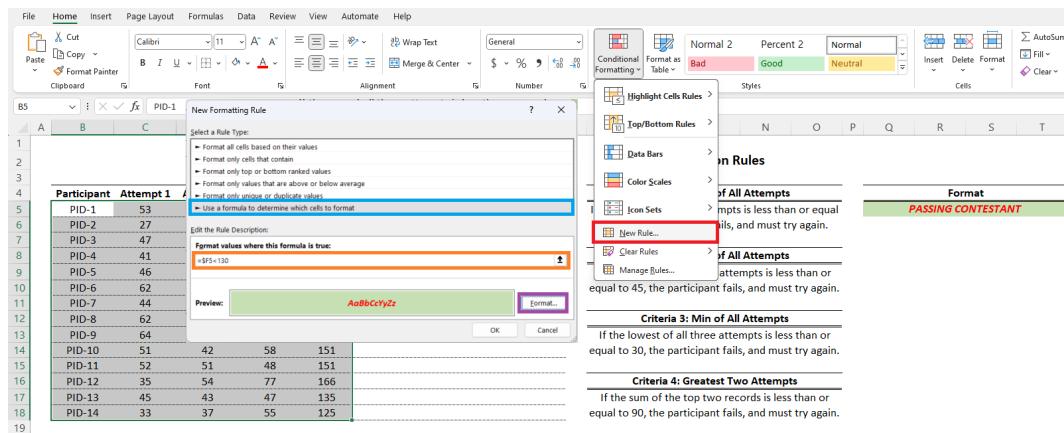


Figure 12: Pass Criteria #1

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-up Scores										Evaluation Rules									
	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
Participant	Attempt 1	Attempt 2	Attempt 3	Total	Highest	Lowest	Sum of Greatest Two												
PID-1	53	43	51	147															
PID-2	27	43	35	105															
PID-3	47	47	44	138															
PID-4	41	41	40	122															
PID-5	46	45	38	129															
PID-6	62	34	36	132															
PID-7	44	62	53	159															
PID-8	62	39	34	135															
PID-9	64	40	32	136															
PID-10	51	42	58	151															
PID-11	52	51	48	151															
PID-12	35	54	77	166															
PID-13	45	43	47	135															
PID-14	33	37	55	125															

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.

The screenshot shows the Microsoft Excel ribbon at the top with the Home tab selected. In the center, there is a table titled "Triathlon" with columns "Contestant" and "Swimming". The "Swimming" column contains values like "Pass" and "Fail". A conditional formatting dialog box is open, titled "New Formatting Rule". Under "Select a Rule Type:", the option "Use a formula to determine which cells to format" is selected. The formula entered is `=AND($C5="Pass",$D5="Pass",$E5="Pass")`. The "Preview" section shows the first few rows of the table with the second row highlighted in green, indicating it meets the criteria. The "Format..." button is visible in the preview area. On the right side of the dialog box, there is a sidebar with various conditional formatting options: "Highlight Cells Rules", "Top/Bottom Rules", "Data Bars", "Color Scales", "Icon Sets", "New Rule...", "Clear Rules", and "Manage Rules...".

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.