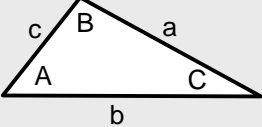


	A	B	C	D	E	F	G	H
7	Trigonometry							
8	These functions are the same as Excel functions with the same names (excluding an							
9	underscore), except they work with the angles in decimal degrees (Excel functions operate							
10	on the angles in radians)							
11								
12	cos_(ang)							
13	sin_(ang)							
14	tan_(ang)							
15	acos_(number)							
16	asin_(number)							
17	atan_(number)							
18	atan2_(number1,number2)							
19								
20	<u>Examples:</u>							
21	ang =		30					
22	num =		0.5					
23	sin_(ang) =		0.5		=sin_(C21)			
24	asin_(num) =		30		=asin_(C22)			
25	tan_(45.7) =		1.024738		=tan_(45.7)			
26								
27								
28	Angles							
29	These functions provide functionality for formatting and converting angles. Angles in deg-min-sec are text							
30	strings and should be converted to decimal degrees with the deg function for use in math operations.							
31								
32	ang_(deg, min, sec) enters angle in deg-min-sec format							
33	<i>deg</i>	degree part of an angle (integer)						
34	<i>min</i>	minute part of an angle (optional positive integer < 60)						
35	<i>sec</i>	second part of an angle (optional positive decimal number < 60)						
36								
37	dms(ang, num_dec) converts angle in decimal degrees into a deg-min-sec text string							
38	<i>ang</i>	angle in decimal degrees						
39	<i>num_dec</i>	optional parameter that specifies number of digits after decimal point in the second						
40	component of the deg-min-sec . If omitted, none is used. This parameter controls the							
41	precision of the conversion (<i>ang</i> being rounded off).							
42								
43	deg(ang) converts deg-min-sec text string into decimal degrees							
44	<i>ang</i>	deg-min-sec text string						
45								
46	<u>Examples:</u>							
47	ang1 =		30.1236					
48	ang2 =		-5°-8'-2.3"		=ang_(-5,8,2.3)			
49	ang1+ang2 =		24.98963		=C47+deg(C48)			
50	ang1+ang2 =		24°-59'-22.66"		=dms(C47+deg(C48),2)			
51	12*sin(ang3) =		5.06945		=12*sin_(deg(C50))			
52								
53								

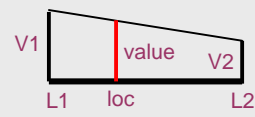
	A	B	C	D	E	F	G	H
54	Triangle Geometry (V2.00)							
55	This function takes three known angle/sides and returns specified remaining							
56	angle/side or triangle area.							
57								
58	trngl (code_given, code_return, par1, par2, par3)							
59								
60	Known	code_given	code_return	par1	par2	par3	Case	
61	Parameters							
62	a, b, c	"abc"	"A"	a-value	b-value	c-value	All three sides are known	
63			"B"					
64			"C"					
65			"area"					
66	a, A, B	"aAB"	"b"	a-value	A-value	B-value	One out of two known angles is opposite to known side	
67			"c"					
68			"C"					
69			"area"					
70	a, b, A	"abA"	"c"	a-value	b-value	A-value	Known angle is opposite to one out of two known sides	
71			"B"					
72			"C"					
73			"area"					
74	a, b, C	"abC"	"c"	a-value	b-value	C-value	Known sides are two legs of known angle	
75			"A"					
76			"B"					
77			"area"					
78	<ul style="list-style-type: none"> Function returns value of parameter specified in code_return. 							
79	<ul style="list-style-type: none"> Function argument and returned angles are in degrees. 							
80	<ul style="list-style-type: none"> Codes are case sensitive and should include enclosed quotation marks if entered directly in the formula. 							
81	<ul style="list-style-type: none"> Side and angle symbology used herein is meant to represent relative side/angle positioning within a 							
82	<ul style="list-style-type: none"> triangle and should be applied in a context of specific case. 							
83								

User Defined Functions and Macros

	A	B	C	D	E	F	G	H
84	<u>Examples:</u>							
85								
86	Given:		Find:					
87	a =	26.1339	A =	70.000	=trngl("abc","A",B87,B88,B89)			
88	b =	25	B =	64.017	=trngl("abc","B",B87,B88,B89)			
89	c =	20	C =	45.983	=trngl("abc","C",B87,B88,B89)			
90								
91	Given:		Find:					
92	a =	26.1339	b =	25.000	=trngl("aAB","b",B92,B93,B94)			
93	A =	70	c =	20.000	=trngl("aAB","c",B92,B93,B94)			
94	B =	64.0167	area =	234.924	=trngl("aAB","area",B92,B93,B94)			
95								
96	Given:		Find:					
97	a =	26.1339	c =	20.000	=trngl("abA","c",B97,B98,B99)			
98	b =	25	B =	64°-1'-0"	=dms(trngl("abA","B",\$B\$97,\$B\$98,\$B\$99))			
99	A =	70	C =	45°-59'-0"	=dms(trngl("abA","C",\$B\$97,\$B\$98,\$B\$99))			
100								
101	Given:		Calculate angle A and triangle perimeter & area:					
102	a =	26.1339	A	70.000	=trngl("abC",C102,\$B\$102,\$B\$103,\$B\$104)			
103	b =	25	Perimeter =	71.134	=B102+B103+trngl("abC","c",B102,B103,B104)			
104	C =	45.983	area	234.922	=trngl("abC",C104,\$B\$102,\$B\$103,\$B\$104)			
105								
106								

	A	B	C	D	E	F	G	H
107	Fractions and Feet-Inch Conversions							
108	These functions convert/round numbers to specified format/fraction. The fraction accuracy is specified by the							
109	denominator. The resulting fraction is an equivalent fraction with the smallest denominator. For example 0.5							
110	with specified denominator of 8 equal to 4/8 transformed to 1/2.							
111								
112	fr(num,denom)		<i>rounds a decimal number to a fraction based on the specified denominator. The</i>					
113			<i>resulting fraction is in Excel fractional format and can be used like any other</i>					
114			<i>number in the spreadsheet except formulas operating on cell ranges.</i>					
115	<i>num</i>	decimal number						
116	<i>denom</i>	Optional positive integer equal to the fraction denominator. 16 is used if it is						
117		omitted						
118								
119	fi(num, denom)		<i>converts decimal number into feet-inch text string. it must be converted into a</i>					
120			<i>decimal number with fd function when used in the math operations.</i>					
121	<i>num</i>	decimal number						
122	<i>denom</i>	optional positive integer equal to the fraction denominator of the inch-part. 16 is						
123		used if it is omitted.						
124								
125	fd(ft-in)		<i>converts feet-inch text string into decimal number</i>					
126	<i>ft-in</i>	text string in feet-inch format (<i>ft-in</i> must be previously obtained using the fi						
127		function)						
128	<u>Examples:</u>							
129	num1 =	-30.6789						
130	num1_16 =	-30 11/16			=fr(C129)			
131	num1_4 =	-30 3/4			=fr(C129,4)			
132	num1_32 =	-30 11/16			=fr(C129,32)			
133	num2 = .75-num1_32 =	31 7/16			=fr(0.75-C132)			
134	A = num1_ft_in_8 =	-30'-8 1/8"			=fi(C129,8)			
135	A-6.7 =	-37'-4 1/2"			=fi(fd(C134)-6.7)			
136	A_dec =	-30.6771			=fd(C134)			
137	num3 =	4'-0 7/16"			=fi(4+7/16/12)			
138								
139								

	A	B	C	D	E	F	G	H	
140	Cell Formula								
141	The cell formula function pr_frm1 returns an expanded version of the cell formula with cell references replaced								
142	by the corresponding values.								
143	<u>Notes:</u>								
144	1. Range references that include a colon (:) (e.g. K219:L220) are not expanded.								
145	2. References to external spreadsheets are expanded only if these spreadsheets are opened concurrently with the workbook containing the reference.								
146									
147	pr_frm1 (<i>cell_ref</i>) returns an expanded version of the formula contained in the target cell								
148	<i>cell_ref</i> reference to target cell (e.g. a16)								
149									
150	<u>Examples:</u>								
151	a =		3.797						
152	b =		1.90		FALSE				
153	c =		0.168755		=1.7*sin_(C152+C151)				
154	c =		=1.7*sin_(1.9+3.797)		=pr_frm1(C153)				
155									
156									
157	Interpolation Functions (V2.00)								
158	Direct and indirect interpolation functions interpolate/extrapolate value at specified location and calculate								
159	location corresponding to specified value from the pair of given locations and values.								
160	Indexed interpolation function interpolates/extrapolates value at specified location from series of value sets.								
161									
162									
163	<u>Direct Interpolation Functions</u>								
164	intrpl_val (<i>loc</i> , <i>L1</i> , <i>L2</i> , <i>V1</i> , <i>V2</i>) returns <i>value</i> @ <i>loc</i>								
165	intrpl_loc (<i>value</i> , <i>L1</i> , <i>L2</i> , <i>V1</i> , <i>V2</i>) returns <i>loc</i> corresponding to <i>value</i>								
166									
167									
168	<u>Example:</u>								
169	L1	L2	V1	V2					
170	100	200	9	87					
171									
172	Location	Value							
173	50	-30						=intrpl_val(A173,\$A\$170,\$B\$170,\$C\$170,\$D\$170)	
174	125	28.5						=intrpl_val(A174,\$A\$170,\$B\$170,\$C\$170,\$D\$170)	
175	200	87						=intrpl_val(A175,\$A\$170,\$B\$170,\$C\$170,\$D\$170)	
176	275	145.5						=intrpl_val(A176,\$A\$170,\$B\$170,\$C\$170,\$D\$170)	
177									
178	Value	Location							
179	-30	50						=intrpl_loc(A179,\$A\$170,\$B\$170,\$C\$170,\$D\$170)	
180	28.5	125						=intrpl_loc(A180,\$A\$170,\$B\$170,\$C\$170,\$D\$170)	
181	87	200						=intrpl_loc(A181,\$A\$170,\$B\$170,\$C\$170,\$D\$170)	
182	145.5	275						=intrpl_loc(A182,\$A\$170,\$B\$170,\$C\$170,\$D\$170)	
183									






	A	B	C	D	E	F	G	H
184	Indirect Interpolation Functions							
185	Prior to using indirect interpolation function, enter L1, L2, V1 & V2 (in this order) in the adjacent cells on the							
186	same row anywhere on the worksheet.							
187								
188	intrpl_val_indr (loc, rng) returns value @ loc							
189	intrpl_loc_indr (value, rng) returns loc corresponding to value							
190								
191	rng range reference to cells containing L1, L2, V1 & V2 (e.g. c2:f2)							
192								
193	<u>Example:</u>							
194	L1	L2	V1	V2				
195	100	200	9	80				
196	200	300	80	-20				
197								
198	Location	Value						
199	50	-26.5			=intrpl_val_indr(A199,\$A\$195:\$D\$195)			
200	125	26.75			=intrpl_val_indr(A200,\$A\$195:\$D\$195)			
201	200	80			=intrpl_val_indr(A201,\$A\$195:\$D\$195)			
202	275	5			=intrpl_val_indr(A202,\$A\$196:\$D\$196)			
203	350	-70			=intrpl_val_indr(A203,\$A\$196:\$D\$196)			
204								
205	Value	Location						
206	-26.5	50			=intrpl_loc_indr(A206,\$A\$195:\$D\$195)			
207	26.75	125			=intrpl_loc_indr(A207,\$A\$195:\$D\$195)			
208	80	200			=intrpl_loc_indr(A208,\$A\$195:\$D\$195)			
209	5	275			=intrpl_loc_indr(A209,\$A\$196:\$D\$196)			
210	-70	350			=intrpl_loc_indr(A210,\$A\$196:\$D\$196)			
211								

	A	B	C	D	E	F	G	H
212	Indexed Interpolation Function							
213	Prior to using this function, enter series of value sets in the adjacent columns anywhere on the worksheet. The							
214	first column contains locations arranged in the ascending order. Remaining columns contain values. The							
215	function references value-columns by index. The first value-column has index 1, second column has index 2							
216	and so on.							
217	indx_intrpl(loc, idx, rng) returns interpolated value from value set in idx -column @ loc							
218	rng range reference to cells containing data columns (e.g. c2:h13)							
219								
220								
221	<u>Example:</u>							
222								
223								
224								
225								
226								
227								
228								
229								
230	Given values:							
231	Location	DataSet-1	DataSet-2					
232	100	9	40					
233	200	80	-30					
234	300	-20	-30					
235								
236	Interpolated values:							
237	DataSet-1							
238	Location	Index =	1					
239	50	-26.5		=indx_intrpl(A239,\$C\$238,\$A\$232:\$C\$234)				
240	125	26.75		=indx_intrpl(A240,\$C\$238,\$A\$232:\$C\$234)				
241	200	80		=indx_intrpl(A241,\$C\$238,\$A\$232:\$C\$234)				
242	275	5		=indx_intrpl(A242,1,\$A\$232:\$C\$234)				
243	350	-70		=indx_intrpl(A243,1,\$A\$232:\$C\$234)				
244								
245	DataSet-2							
246	Location	Index =	2					
247	50	75		=indx_intrpl(A247,\$C\$246,\$A\$232:\$C\$234)				
248	125	22.5		=indx_intrpl(A248,\$C\$246,\$A\$232:\$C\$234)				
249	200	-30		=indx_intrpl(A249,\$C\$246,\$A\$232:\$C\$234)				
250	275	-30		=indx_intrpl(A250,\$C\$246,\$A\$232:\$C\$234)				
251	350	-30		=indx_intrpl(A251,2,\$A\$232:\$C\$234)				
252								
253								

	A	B	C	D	E	F	G	H																							
254	System of Linear Equations (V2.00)																														
255	Solution is obtained for system of n-linear equations expressed as follows:																														
256																															
257	$K_{11}X_1 + K_{12}X_2 + \dots + K_{1n}X_n + C_1 = 0$																														
258	$K_{21}X_1 + K_{22}X_2 + \dots + K_{2n}X_n + C_2 = 0$																														
259																														
260	$K_{n1}X_1 + K_{n2}X_2 + \dots + K_{nn}X_n + C_n = 0$																														
261																															
262	To solve for X-variables, do the following:																														
263	1) Enter K-coefficients and C-constants anywhere on the worksheet in the adjacent cells																														
264	as follows:																														
265																															
266	<table style="border-collapse: collapse; margin-left: 20px;"> <tr> <td style="border: none;"></td> <td style="border: none; text-align: center;">n+1 columns</td> <td style="border: none;"></td> </tr> <tr> <td style="border: none; padding-right: 10px;">267</td> <td style="border: 1px solid black; padding: 2px;">K_{11}</td> <td style="border: 1px solid black; padding: 2px;">$K_{12} \dots K_{1n}$</td> <td style="border: 1px solid black; padding: 2px;">C_1</td> <td style="border: none;"></td> </tr> <tr> <td style="border: none; padding-right: 10px;">268</td> <td style="border: 1px solid black; padding: 2px;">K_{21}</td> <td style="border: 1px solid black; padding: 2px;">$K_{22} \dots K_{2n}$</td> <td style="border: 1px solid black; padding: 2px;">C_2</td> <td style="border: none;"></td> </tr> <tr> <td style="border: none; padding-right: 10px;">269</td> <td style="border: none; padding: 2px;">.....</td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> </tr> <tr> <td style="border: none; padding-right: 10px;">270</td> <td style="border: 1px solid black; padding: 2px;">K_{n1}</td> <td style="border: 1px solid black; padding: 2px;">$K_{n2} \dots K_{nn}$</td> <td style="border: 1px solid black; padding: 2px;">C_n</td> <td style="border: none; padding-left: 10px;">} n rows</td> </tr> </table>									n+1 columns		267	K_{11}	$K_{12} \dots K_{1n}$	C_1		268	K_{21}	$K_{22} \dots K_{2n}$	C_2		269				270	K_{n1}	$K_{n2} \dots K_{nn}$	C_n	} n rows
	n+1 columns																														
267	K_{11}	$K_{12} \dots K_{1n}$	C_1																												
268	K_{21}	$K_{22} \dots K_{2n}$	C_2																												
269																														
270	K_{n1}	$K_{n2} \dots K_{nn}$	C_n	} n rows																											
271																															
272	2) Use the following function:																														
273	solve_lineq (<i>rng</i>) returns string of X-values separated by comma																														
274	<i>rng</i> range reference to cells containing K & C values (e.g. C2:F4)																														
275																															
276	To obtain value of individual variables, use the following function:																														
277	lineq_var (<i>cell_ref</i> , <i>i</i>) returns X_i																														
278	<i>cell_ref</i> reference to cell containing solve_lineq function (e.g. b23)																														
279	<i>i</i> X-variable index																														
280																															

User Defined Functions and Macros

	A	B	C	D	E	F	G	H
281	<i>Example:</i>							
282								
283	Given system of 3-linear equations:							
284	$4X_1 + 9X_2 + 43 = 0$							
285	$9X_1 + 24X_2 + 12X_3 - 47 = 0$							
286	$12X_1 + 8X_2 - X_3 = 0$							
287								
288	Set up data:							
289	4	9	0	43				
290	9	24	12	-47				
291	12	8	-1	0				
292								
293	Solve system of equations:							
294	6.22408026755854,-7.54403567447046,14.3366778149387					=solve_lineq(A289:D291)		
295								
296	Get x-values:							
297	$X_1 =$	6.22408			=ROUND(lineq_var(\$A\$294,1),5)			
298	$X_2 =$	-7.54404			=ROUND(lineq_var(\$A\$294,2),5)			
299	$X_3 =$	14.33668			=ROUND(lineq_var(\$A\$294,3),5)			
300								
301	Check solution:							
302	=4*6.22408+9*-7.54404+0*14.33668+43 =				0.000	ok		
303	=9*6.22408+24*-7.54404+12*14.33668+-47 =				0.000	ok		
304	=12*6.22408+8*-7.54404+-1*14.33668+0 =				0.000	ok		
305								
306								

	A	B	C	D	E	F	G	H
307	Cell Inspector (F2 default key)							
308	Press F2 to display active cell formula and its expanded version with the cell references replaced by the							
309	corresponding values.							
310	<u>Notes:</u>							
311	1. Range references that include a colon (:) (e.g. K219:L220) are not expanded.							
312	2. References to external spreadsheets are expanded only if these spreadsheets are opened concurrently with							
313	the workbook containing reference.							
314								
315								
316	Cell Range Linker/Transformer (F3 default key)							
317	The Cell Range Linker/Transformer creates a new cell range that is linked to the target range. The pattern							
318	of the new range is derived from the target range based on the chosen transformation option. Press F3 to							
319	launch the Cell Range Linker/Transformer , and follow the instructions.							
320								
321	<u>Examples:</u>							
322								
323	Target Range							
324	1	5						
325	2	6						
326	3	7						
327	4	8						
328								
329	Range linked to Target Range with Option 							
330	1	2	3	4				
331	5	6	7	8				
332								
333	Range linked to Target Range with Option 							
334	5	1						
335	6	2						
336	7	3						
337	8	4						
338								
339	Range linked to Target Range with Option 							
340	4	8						
341	3	7						
342	2	6						
343	1	5						
344								
345								
346								

	A	B	C	D	E	F	G	H														
347	Multi-AND/OR Formula Constructor (Alt+F4 default key) (V2.00)																					
348	This macro assembles text of multi-AND/OR logical formula (returning TRUE or FALSE) from the list of																					
349	Excel formulas (returning TRUE or FALSE) in accordance with target formula outline.																					
350	Excel formulas and target formula outline are entered in the AND/OR																					
351	block anywhere on the worksheet. AND/OR block consist of two																					
352	columns. The first column is designated for the text labels that can be																					
353	any descriptive text. The last row in the second column is reserved for																					
354	the target formula outline. Remaining rows in the second column retain																					
355	Excel formulas.																					
356	<table border="1" style="float: right;"> <thead> <tr> <th>Column1</th> <th>Column2</th> </tr> </thead> <tbody> <tr> <td>cond1:</td> <td>formula1</td> </tr> <tr> <td>cond2:</td> <td>formula2</td> </tr> <tr> <td>cond3:</td> <td>formula3</td> </tr> <tr> <td>.....</td> <td>.....</td> </tr> <tr> <td>Last cond:</td> <td>last formula</td> </tr> <tr> <td>Target Cnd:</td> <td>Outline</td> </tr> </tbody> </table>								Column1	Column2	cond1:	formula1	cond2:	formula2	cond3:	formula3	Last cond:	last formula	Target Cnd:	Outline
Column1	Column2																					
cond1:	formula1																					
cond2:	formula2																					
cond3:	formula3																					
.....																					
Last cond:	last formula																					
Target Cnd:	Outline																					
357	<u>Target Formula Outline</u>																					
358	<ul style="list-style-type: none"> • Target Formula Outline is a symbolic expression that consists of at least one out of three available logical operands AND, OR and NOT (case insensitive) operating on the Excel formulas referenced by their position in the AND/OR block starting with 1 at the top (e.g. (1 and 2 and 4) or (3 and not(5))). 																					
359	<ul style="list-style-type: none"> • The macro assembles Excel formula according to VBA precedence rules: NOT is evaluated first, then AND, and finally OR. Parentheses () may be used to alter precedence. For example, suppose cond1=TRUE, cond2=FALSE and Cond3=FALSE, then: 																					
360	1 or 2 and 3 = TRUE or (FALSE and FALSE) =TRUE or FALSE = TRUE																					
361	(1 or 2) and 3 = (TRUE or FALSE) and FALSE = TRUE and FALSE = FALSE																					
362	<ul style="list-style-type: none"> • Expression that NOT-operand operates on must be enclosed in the parentheses, e.g. not(3 and 5). 																					
363	<ul style="list-style-type: none"> • Formula outline doesn't have to include references to every Excel formula in the AND/OR block, same reference may be used multiple times, and an order in which references are placed within the outline depends on the formula logic only. 																					
364	To construct multi-AND/OR formula and use it, do the following:																					
365	1) Set up AND/OR-block.																					
366	2) Enter word "end_or" (case insensitive) immediately below bottom left corner cell of the AND/OR-block.																					
367	3) Select top left corner cell of the AND/OR-block and press Alt+F4 --> text of formula containing text of the multi-AND/OR formula will be placed in the cell on the right side from the word "end".																					
368	4) Move or copy resulting text to the intended destination such as IF-formula, Database query or conditional formatting "Formula ls" field. In case of conditional formatting, text can be pasted by pressing SHIFT+ INSERT buttons in the earlier Excel versions where other copying methods are not accessible. To use text as a formula, prefix it with "=".																					
369	<p>Note:</p>																					
370	Because final formula is not linked to its outline, AND/OR-block can be deleted after its intended use.																					
371																						
372																						
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374																						
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	A	B	C	D	E	F	G	H
380	<i>Example:</i>							
381	Built formula that evaluates steel beam flange proportions in accordance with AASHTO requirements. The							
382	formula should return TRUE if each requirement is met, otherwise it should return FALSE.							
383	Requirements:							
384	1) $b \leq 24t$							
385	2) $b \geq D/6$							
386	3) $t \geq 1.1T_w$							
387	4) $0.1 \leq I_{yc}/I_{yt} \leq 10$							
388								
389	Given:							
390	b	t	D	T_w	I_{yc}/I_{yt}			
391	12	1.25	75	0.5	0.7			
392								
393	Are all req's met?	FALSE		=AND(A391<=24*B391,A391>=C391/6,B391>=1.1*D391,AND(0.1<=E391,E391<=10))				
394	formula entered in this cell is a copy of text produced by macro (see below) with added "="							
395								
396								
397	Select this cell and press Alt+F4							
398					<u>AND/OR-Block</u>			
399	cond1-->	TRUE	AND/OR block		<u>Column 2 Content</u>			
400	cond2-->	FALSE			=A391<=24*B391			
401	cond3-->	TRUE	AND/OR target		=A391>=C391/6			
402	cond4-->	TRUE	formula outline		=B391>=1.1*D391			
403	Target Cnd:	1 and 2 and 3 and 4				=AND(0.1<=E391,E391<=10)		
404	end_or	and(A391<=24*B391,A391>=C391/6,B391>=1.1*D391,AND(0.1<=E391,E391<=10))				1 and 2 and 3 and 4		
405	formula text returned by macro							
406								
407								

	A	B	C	D	E	F	G	H
408	Multi-IF Formula Constructor (Alt+F5 default key) (V2.00)							
409	This macro reads IF-formula outline and returns text of a formula containing multiple IF-statements.							
410	IF-formula outline can be entered anywhere on the worksheet and is comprised of the vertically stacked							
411	individual IF-blocks. Each IF-block consist of four rows and two columns as follow:							
412								
413		Column 1	Column 2					
414	Row 1	Tile						
415	Row 2	condition:	formula					
416	Row 3	if true:	IF_tag or	number/text/formula				
417	Row 4	if false:	IF_tag or	number/text/formula				
418								
419	<ul style="list-style-type: none"> Labels in column 1 can be any descriptive text. 							
420	<ul style="list-style-type: none"> Condition formula must yield TRUE or FALSE (e.g. =C12>=12). 							
421	<ul style="list-style-type: none"> Rows 3 and 4, column 2 content corresponds to true and false condition formula evaluation, respectively. 							
422	<ul style="list-style-type: none"> When used, text in rows 3 & 4, column 2 must be enclosed by quotations marks. 							
423	<ul style="list-style-type: none"> IF_tag refers to IF-block which statement is to be placed in the referring tag position. IF_tag consists of 							
424	<ul style="list-style-type: none"> word "IF" (case insensitive) and a number (e.g. IF2), where number = referenced IF-block number. The macro counts IF-blocks from top (first) to bottom (last). 							
425	<ul style="list-style-type: none"> Specific IF_tag can be used only once and must refer to IF-block defined below referring tag. 							
426	<ul style="list-style-type: none"> Maximum of 7 nested IF-statements are allowed per Excel documentation. Maximum number of F- 							
427	<ul style="list-style-type: none"> blocks depends on specific case and may be greater than Excel limit on the nested IF-statements. 							
428	To construct multi-IF formula and use it, do the following:							
429	1) Set up IF-formula outline.							
430	2) Enter word "end" (case insensitive) immediately below bottom left corner cell of the last IF-block.							
431	3) Select top left corner cell of the top IF-block and press Alt+F5 --> text of formula containing multiple IF-							
432	statements will be placed in the cell on the right side from the word "end_if".							
433	4) Move or copy resulting text to the intended formula destination and prefix it with "=" or use text as a part							
434	of another formula.							
435	<u>Note:</u>							
436	Because final formula is not linked to its outline, IF-formula outline can be deleted after its intended use.							
437								
438								
439								

User Defined Functions and Macros

	A	B	C	D	E	F	G	H
440	<i>Example:</i>							
441	Calculate Moment Distribution Factor (LLDF) for interior CIP concrete multicell box per							
442	AASHTO LRFD design provisions for approximate method of analysis:							
443								
444	Cast-in-Place Concrete Multicell Box	d	One Design Lane Loaded:			$\left(1.75 + \frac{S}{3.6}\right) \left(\frac{1}{L}\right)^{0.35} \left(\frac{1}{N_c}\right)^{0.45}$		
445			Two or More Design Lanes Loaded:			$\left(\frac{13}{N_c}\right)^{0.3} \left(\frac{S}{5.8}\right) \left(\frac{1}{L}\right)^{0.25}$		
446							$7.0 \leq S \leq 13.0$ $60 \leq L \leq 240$ $N_c \geq 3$	
447							If $N_c > 8$ use $N_c = 8$	
448								
449								
450	No. loaded lanes =		6					
451	S =		10					
452	L =		200					
453	Nc =		9					
454	LLDF =		0.53036					=IF(AND(C451>=7,\$C\$451<=13),IF(ANI)
455								formula entered in this cell is a copy of text produced by macro
456								(see below) with added "="
457								
458	if1_block	- check S-applicability						IF-Block
459	condition:	TRUE						Column 2 Content
460	if true:	if2						=AND(C451>=7,\$C\$451<=13)
461	if false:	"S --> outside range of applicability"						IF_tag
462	if2_block	- check L-applicability						exit text
463	condition:	TRUE						=AND(C452>=60,C452<=240)
464	if true:	if3						IF_tag
465	if false:	"L --> outside range of applicability"						exit text
466	if3_block	- check Nc-applicability						
467	condition:	TRUE						=C453>=3
468	if true:	if4						IF_tag
469	if false:	"Nc --> outside range of applicability"						exit text
470	if4_block	- choose formula depending on number of loaded lanes						
471	condition:	FALSE						=C450=1
472	if true:	if5						IF_tag
473	if false:	if6						IF_tag
474	if5_block	- 1 lane loaded, conditional upon Nc value						
475	condition:	TRUE						=C453>8
476	if true:	0.27806						=(1.75+C451/3.6)*(1/C452)^0.35*(1/8)^0.45
477	if false:	0.26370						=(1.75+C451/3.6)*(1/C452)^0.35*(1/C453)^0.45
478	if6_block	- more than 1 lane loaded, conditional upon Nc value						
479	condition:	TRUE						=C453>8
480	if true:	0.53036						=(13/8)^0.3*C451/5.8*(1/C452)^0.25
481	if false:	0.51195						=(13/C453)^0.3*C451/5.8*(1/C452)^0.25
482	End_if	if(AND(C451>=7,\$C\$451<=13),if(AND(C452>=60,C452<=240),if(C453>=3,if(C450=1,if(C453>8,(1.75+C451/3.6)*(1/C452)^0.35*(1/8)^0.45,(1.75+C451/3.6)*(1/C452)^0.35*(1/C453)^0.45),if(C453>8,13/8)^0.3*C451/5.8*(1/C452)^0.25,(13/C453)^0.3*C451/5.8*(1/C452)^0.25)), "Nc --> outside range of applicability"), "L --> outside range of applicability"), "S --> outside range of applicability")						
483								
484								
485								
486								formula text returned by macro
487								