Excel Data

logic and errors

Logical Operators

NOT() returns the opposite of a logical value
example: NOT(FALSE) is TRUE

AND() evaluates all inputs and returns FALSE when *any* of them are FALSE
example: AND(6 > 5, 5 > 4, 4 > 3, 3 < 2) is FALSE

OR() evaluates all inputs and returns TRUE when *any* of them are TRUE
example: OR(6 + 3 > 2, 8 / 4 > 2, 2 > 2)

The IF() function takes a logical condition as its first input, what to return if the condition is TRUE as its second input, and what to return if the condition is FALSE as its third input.

IF(<logical test>, <return if true>, <return if false>)

Here are the first few rows of the Starwars data:

	A	B	C	D	E	F	G	H	I	J
1	name	height	mass	hair_color	skin_color	eye_color	age	gender	homeworld	species
2										
3	Luke Skywalker	172	77	blond	fair	blue	19	male	Tatooine	Human
4	C-3PO	167	75	NA	gold	yellow	112	NA	Tatooine	Droid
5	R2-D2	96	32	NA	white, blue	red	33	NA	Naboo	Droid
6	Darth Vader	202	136	none	white	yellow	41.9	male	Tatooine	Human
7	Leia Organa	150	49	brown	light	brown	19	female	Alderaan	Human
8	Owen Lars	178	120	brown, grey	light	blue	52	male	Tatooine	Human
9	Beru Whitesun lars	165	75	brown	light	blue	47	female	Tatooine	Human
10	R5-D4	97	32	NA	white, red	red	NA	NA	Tatooine	Droid
11	Biggs Darklighter	183	84	black	light	brown	24	male	Tatooine	Human
12	Obi-Wan Kenobi	182	77	auburn, whit	fair	blue-gray	57	male	Stewjon	Human
13	Anakin Skywalker	188	84	blond	fair	blue	41.9	male	Tatooine	Human
14	Wilhuff Tarkin	180	NA	auburn, grey	fair	blue	64	male	Eriadu	Human
15	Chewbacca	228	112	brown	unknown	blue	200	male	Kashyyyk	Wookiee

What will the following functions return?

1. =IF(B3 > 150, “tall”, “short”)
2. =IF(C4 = "NA", IF(C4 = "brown", "brunette", "not brunette"), "unknown")

The SWITCH() evaluates an input and returns a value as mapped in result/output pairs.

SWITCH(<value to evaluate>, <match1>, <output1>, <match2>, <output2>)

- **Can matchup to 126 conditions!!**
- **Cannot use functions, <, or > in the value to evaluate**

=SWITCH(M3, "Ground Plane", "Non-Climber", "Above Ground", "Climber")

Squ	D Hectare	E Shift	F Date	G Hectare Squ	H Age	I Primary Fur	J Highlight Fi	K Combinatic	L Color notes	M Location	N Climber?
-10	37F	PM	10142018	3				+			
-10	37E	PM	10062018	3	Adult	Gray	Cinnamon	Gray+Cinnamon		Ground Plane	Non-Climber
101	02E	AM	10102018	3	Adult	Cinnamon		Cinnamon+		Above Ground	Climber
101	05D	PM	10182018	5	Juvenile	Gray		Gray+		Above Ground	Climber
-1C	39B	AM	10182018	1				+		Above Ground	Climber
I-1C	33H	AM	10192018	2	Juvenile	Gray	Cinnamon	Gray+Cinnamon		Ground Plane	Non-Climber
102	06G	PM	10202018	2	Adult	Gray		Gray+		Ground Plane	Non-Climber
-10	35C	PM	10132018	3		Gray	Cinnamon	Gray+Cinnamon		Ground Plane	Non-Climber
10C	07B	AM	10082018	9	Adult	Gray		Gray+		Ground Plane	Non-Climber

The columns **Other Activities** and **Other Interactions** columns in the Central Park squirrel data look interesting…but there are also a lot of missing values.

R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	
Climbing	Eating	Foraging	Other Activities	Kuks	Quaas	Moans	Tail flags	Tail twitche	Approache:	Indifferent	Runs from	Other Interactions	Lat/Long	Zip
FALSE	FALSE	FALSE		FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE		POINT (-73.95	
FALSE	FALSE	FALSE		FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	me	POINT (-73.95	
TRUE	FALSE	FALSE		FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	FALSE		POINT (-73.97	
TRUE	FALSE	FALSE		FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE		POINT (-73.97	
FALSE	FALSE	FALSE	unknown	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE		POINT (-73.95	
FALSE	FALSE	FALSE	wrestling with mother	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE		POINT (-73.95	
FALSE	FALSE	FALSE		FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	FALSE		POINT (-73.97	
FALSE	FALSE	TRUE		FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE		POINT (-73.96	
FALSE	FALSE	TRUE		FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	FALSE		POINT (-73.97	
FALSE	TRUE	TRUE		FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE		POINT (-73.95	
FALSE	FALSE	TRUE		FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE		POINT (-73.97	
FALSE	FALSE	TRUE		FALSE	FALSE	FALSE	FALSE	TRUE	FALSE	TRUE	FALSE		POINT (-73.96	
FALSE	FALSE	TRUE		FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE		POINT (-73.95	
FALSE	FALSE	TRUE		FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	FALSE		POINT (-73.95	
FALSE	FALSE	FALSE		FALSE	FALSE	FALSE	TRUE	TRUE	FALSE	FALSE	FALSE		POINT (-73.96	
TRUE	FALSE	FALSE	grooming	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	FALSE		POINT (-73.97	
FALSE	FALSE	TRUE		FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	FALSE		POINT (-73.96	

Here's how we can filter down to the rows that aren't blank:

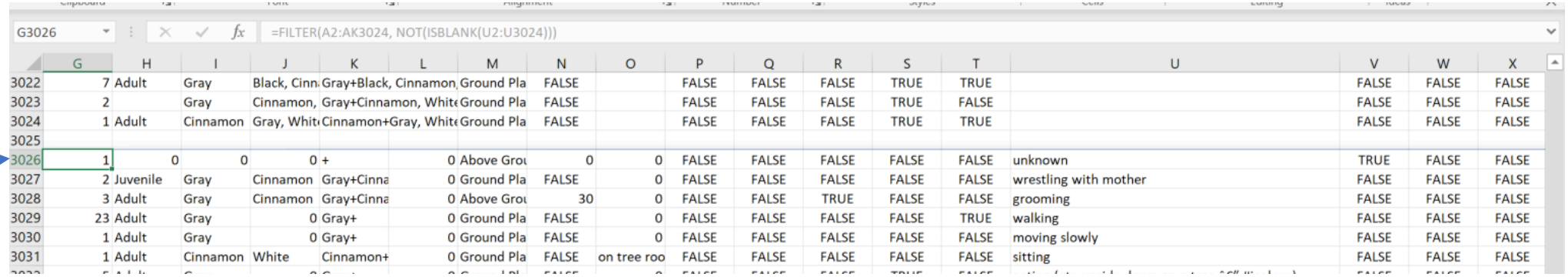
1. Use the ISBLANK() function to evaluate whether data is in the cell for each row in the **Other Activities** column (column U).

2. Because you want the rows that return FALSE for ISBLANK(), you next need to wrap the ISBLANK() with NOT().

3. Now you have created the condition for your FILTER(). The first argument is a range to include the entire spreadsheet.

FILTER(A2:AK3024, NOT(ISBLANK(U2:U3024)))

Put this formula below your data.



	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
3022	7	Adult	Gray	Black, Cinn	Gray+Black, Cinnamon		Ground Pla	FALSE		FALSE	FALSE	FALSE	TRUE	TRUE		FALSE	FALSE	FALSE
3023	2		Gray	Cinnamon,	Gray+Cinnamon, White		Ground Pla	FALSE		FALSE	FALSE	FALSE	TRUE	FALSE		FALSE	FALSE	FALSE
3024	1	Adult	Cinnamon	Gray, Whit	Cinnamon+Gray, White		Ground Pla	FALSE		FALSE	FALSE	FALSE	TRUE	TRUE		FALSE	FALSE	FALSE
3025																		
3026	1	0	0	0	+	0	Above Grou	0	0	FALSE	FALSE	FALSE	FALSE	FALSE	unknown	TRUE	FALSE	FALSE
3027	2	Juvenile	Gray	Cinnamon	Gray+Cinna	0	Ground Pla	FALSE	0	FALSE	FALSE	FALSE	FALSE	FALSE	wrestling with mother	FALSE	FALSE	FALSE
3028	3	Adult	Gray	Cinnamon	Gray+Cinna	0	Above Grou	30	0	FALSE	FALSE	TRUE	FALSE	FALSE	grooming	FALSE	FALSE	FALSE
3029	23	Adult	Gray	0	Gray+	0	Ground Pla	FALSE	0	FALSE	FALSE	FALSE	FALSE	TRUE	walking	FALSE	FALSE	FALSE
3030	1	Adult	Gray	0	Gray+	0	Ground Pla	FALSE	0	FALSE	FALSE	FALSE	FALSE	FALSE	moving slowly	FALSE	FALSE	FALSE
3031	1	Adult	Cinnamon	White	Cinnamon+	0	Ground Pla	FALSE	on tree roo	FALSE	FALSE	FALSE	FALSE	FALSE	sitting	FALSE	FALSE	FALSE

This returns the 437 rows where the **Other Activities** column is not blank:

3023	2		Gray	Cinnamon,	Gray+Cinnamon, White	Ground Pla	FALSE		FALSE	FALSE	FALSE	TRUE	FALSE			FALSE
3024	1	Adult	Cinnamon	Gray, Whit	Cinnamon+Gray, White	Ground Pla	FALSE		FALSE	FALSE	FALSE	TRUE	TRUE			FALSE
3025																
3026	1	0	0	0	+	0 Above Grou	0	0	FALSE	FALSE	FALSE	FALSE	FALSE	unknown		TRUE
3027	2	Juvenile	Gray	Cinnamon	Gray+Cinna	0 Ground Pla	FALSE	0	FALSE	FALSE	FALSE	FALSE	FALSE	wrestling with mother		FALSE
3028	3	Adult	Gray	Cinnamon	Gray+Cinna	0 Above Grou	30	0	FALSE	FALSE	TRUE	FALSE	FALSE	grooming		FALSE
3029	23	Adult	Gray	0	Gray+	0 Ground Pla	FALSE	0	FALSE	FALSE	FALSE	FALSE	TRUE	walking		FALSE
3030	1	Adult	Gray	0	Gray+	0 Ground Pla	FALSE	0	FALSE	FALSE	FALSE	FALSE	FALSE	moving slowly		FALSE
3031	1	Adult	Cinnamon	White	Cinnamon+	0 Ground Pla	FALSE	on tree roo	FALSE	FALSE	FALSE	FALSE	FALSE	sitting		FALSE
3032	5	Adult	Gray	0	Gray+	0 Ground Pla	FALSE	0	FALSE	FALSE	FALSE	TRUE	FALSE	eating (ate upside down on a tree â€" #jealous)		FALSE
3033	1	Adult	Gray	White	Gray+Whit	0 Ground Pla	FALSE	0	TRUE	FALSE	FALSE	FALSE	FALSE	running (with nut)		FALSE
3034	6	Adult	Gray	Cinnamon	Gray+Cinna	0 Ground Pla	FALSE	0	FALSE	FALSE	FALSE	FALSE	FALSE	playing with #5		FALSE
3035	3	Adult	Gray	Cinnamon	Gray+Cinna	0 Ground Pla	FALSE	0	FALSE	FALSE	FALSE	FALSE	FALSE	hiding nut		FALSE
3036	10	Adult	Gray	White	Gray+Whit	0 Ground Pla	FALSE	0	FALSE	FALSE	FALSE	FALSE	TRUE	drank from a pond of rain water		FALSE
3037	1	Adult	Gray	0	Gray+	0 Above Grou	50	0	FALSE	FALSE	TRUE	FALSE	FALSE	sitting		FALSE
3038	3	Adult	Gray	0	Gray+	0 Above Grou	8	0	FALSE	TRUE	FALSE	FALSE	FALSE	chasing (#4 across trees)		FALSE
3039	1	Adult	Gray	Cinnamon	Gray+Cinna	0 Ground Pla	FALSE	0	FALSE	FALSE	FALSE	FALSE	FALSE	gathering acorns		FALSE
3040	6	Adult	Cinnamon	0	Cinnamon+	0 Ground Pla	FALSE	0	TRUE	FALSE	FALSE	TRUE	TRUE	eating (a mushroom),circles around us,really fat,scratcl		FALSE
3041	1	Adult	Gray	Black	Gray+Black	0 Ground Pla	FALSE	0	FALSE	FALSE	FALSE	FALSE	TRUE	digging		FALSE
3042	2	Adult	Gray	0	Gray+	0 Ground Pla	FALSE	0	TRUE	FALSE	FALSE	FALSE	TRUE	walking		FALSE
3043	4	Adult	Gray	0	Gray+	0 Above Grou	12	on tree knc	FALSE	FALSE	FALSE	FALSE	FALSE	sitting		FALSE
3044	4	Juvenile	Gray	0	Gray+	0 Above Grou	10	tree near la	FALSE	FALSE	FALSE	FALSE	FALSE	walking on branch		FALSE
3045	5	Juvenile	Gray	Cinnamon	Gray+Cinna	0 Ground Pla	FALSE	0	FALSE	FALSE	FALSE	FALSE	TRUE	being chased,was pushed by other squirrel		TRUE
3046	1	Adult	Gray	White	Gray+Whit	0 Above Grou	25	Climbing tr	FALSE	FALSE	TRUE	FALSE	FALSE	climbing (tree)		FALSE
3047	7	0	Gray	0	Gray+	0 Ground Pla	FALSE	"FIELD"	FALSE	TRUE	FALSE	FALSE	FALSE	chasing #8		FALSE
3048	3	Adult	Gray	0	Gray+	0 Above Grou	2	bottom of t	FALSE	FALSE	FALSE	TRUE	FALSE	still		FALSE
3049	3	Adult	Gray	Cinnamon	Gray+Cinna	0 Ground Pla	FALSE	0	TRUE	FALSE	FALSE	FALSE	FALSE	stop to look at meâ€"then ran		FALSE

Exercises

1. There is particular interest in squirrel with ID **6D-PM-1020-01**. This squirrel repeatedly runs onto the baseball field and seems fearless of the players on the field. This squirrel was observed in Hectare 06D. Insert a column to the right of the Hectare column. Call it **Near BB Squirrel**. Use a formula to identify squirrels who were observed in adjacent hectares (05D, 07D, 06C, and 06E). Use a filter to isolate just the 31 adjacent squirrels.

2. Find the squirrels that seemed *threatened*. Communicating threats may take the form of **Quaas**, **Moans**, **Tail Flags**, or **Run**(ning) **From** according to the documentation.