Microsoft Excel Level 2

By QCL

Before starting

1. Make sure you sign in.
2. Download files from https://cmc-qcl.github.io/Excel-L2-Workshop/

Agenda

1. More lookup functions: returns a value from a range or from an array
    - VLOOKUP (approximate match)
    - Index Match
2. Common functions: defined task using specific values in a particular order
    - Count
    - Sum
3. Logical functions: comparison of values or statements
    - IF
    - AND
    - OR
    - NOT

Today's data

	A	B	C	D	E
1	id	country	gender	age	window
2	1	South Korea	female	62	0
3	2	Singapore	male	27	1
4	3	Taiwan	male	35	1
5	4	Hong Kong	male	43	1
6	5	China	female	32	2
7	6	China	male	44	2
8	7	Singapore	female	48	2
9	8	Germany	male	32	2
10	9	Switzerland	male	70	2
11	10	Japan	female	25	3

File name: COV19_IndividualList.xlsx

5 fields (column): id, country, gender, age and window (days from exposure to symptom onset)

Total of 1086 rows (1085 cases)

https://www.kaggle.com/sudalairajkumar/novel-corona-virus-2019-dataset

VLOOKUP approximate match

Categorize window period based upon # of days:

Enter “# days” in Cell G1, ”window” in Cell G2

Construct a table in the G5: H8 range (make it look like the green table)

In Cell H2, input the VLOOKUP function:
“=VLOOKUP(H1, G6: H8, 2, TRUE)”

- H1 : cell to enter # of days
- G6: H8: vertical search range
- 2: return value in the row from the second column of the green table
- True - the next largest value that is less than the value being looked up

	A	B	C	D	E	F	G	H
1	id	country	gender	age	window		# days	25
2	1	South Korea	female	62	0		window	above average
3	2	Singapore	male	27	1			
4	3	Taiwan	male	35	1			
5	4	Hong Kong	male	43	1		window	time
6	5	China	female	32	2		0	below average
7	6	China	male	44	2		14	average
8	7	Singapore	female	48	2		21	above average
9	8	Germany	male	32	2			
10	9	Switzerland	male	70	2			
11	10	Japan	female	25	3			

Index

Look up the cell content at position 5 in range D1: D1086 (age):

Enter “age” in Cell G2

In Cell H2, input the INDEX function:
“=INDEX(D1: D1086, 5)”

- D1: D1086 - range
- 5: position # to look up

H2 =INDEX(D1:D1086, 5)

	A	B	C	D	E	F	G	H
1	id	country	gender	age	window		id	
2	1	South Korea	female	62	0		age	43
3	2	Singapore	male	27	1			
4	3	Taiwan	male	35	1			
5	4	Hong Kong	male	43	1			
6	5	China	female	32	2			
7	6	China	male	44	2			
8	7	Singapore	female	48	2			
9	8	Germany	male	32	2			
10	9	Switzerland	male	70	2			
11	10	Japan	female	25	3			

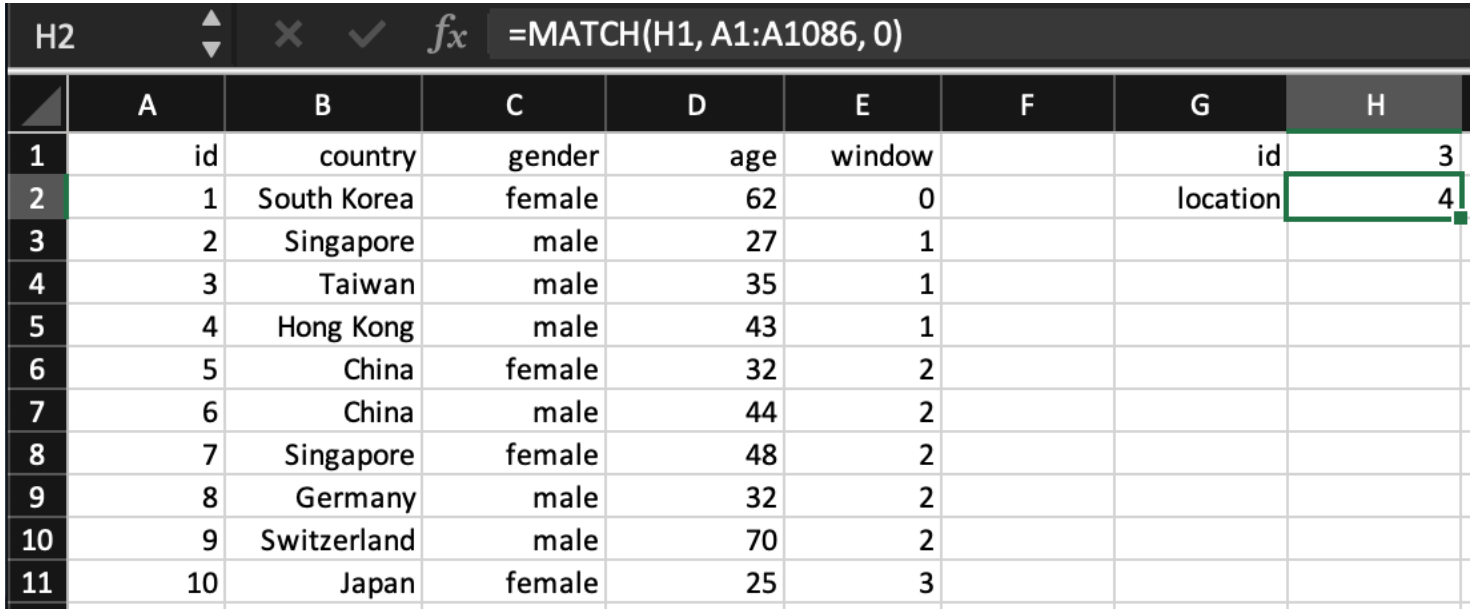
Match

Look up position of id number 3 in the range A1: A1086:

Enter “id” in Cell G1, ”location” in Cell G2

In Cell H2, input the MATCH function:
“=MATCH(H1, A1:A1086, 0)”

- H1: cell to enter id #
- A1: A1086 - range
- 0: return exact match



	A	B	C	D	E	F	G	H
1	id	country	gender	age	window		id	3
2	1	South Korea	female	62	0		location	4
3	2	Singapore	male	27	1			
4	3	Taiwan	male	35	1			
5	4	Hong Kong	male	43	1			
6	5	China	female	32	2			
7	6	China	male	44	2			
8	7	Singapore	female	48	2			
9	8	Germany	male	32	2			
10	9	Switzerland	male	70	2			
11	10	Japan	female	25	3			

Index Match (one way)

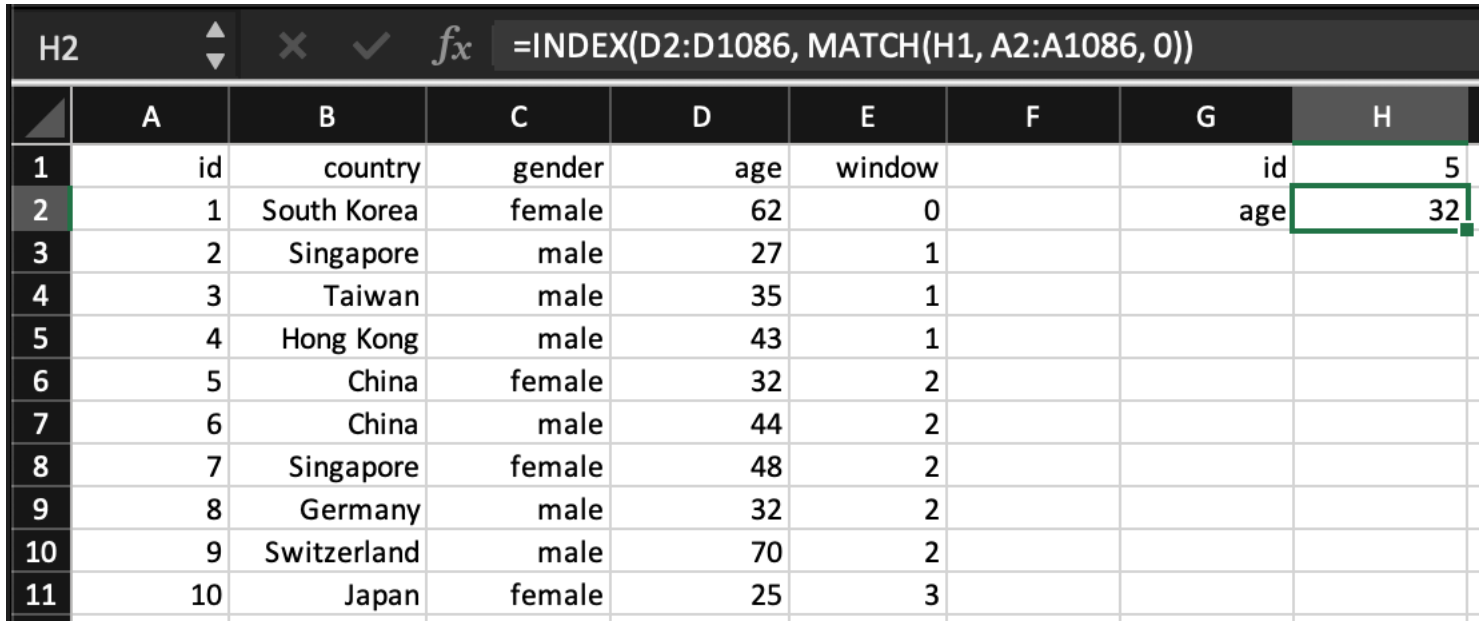
Look up age based upon id:

Enter “id” in Cell G1 and “age” in Cell G2

In Cell H2, input the INDEX function:

“= INDEX(D2: D1086, MATCH(H1, A2: A1086, 0))

- D2: D1086: column (age) to look up
- MATCH: allow look up the age of id entered
- H1: id #
- A2: A1086: column (id)
- 0: exact match



	A	B	C	D	E	F	G	H
1	id	country	gender	age	window		id	5
2	1	South Korea	female	62	0		age	32
3	2	Singapore	male	27	1			
4	3	Taiwan	male	35	1			
5	4	Hong Kong	male	43	1			
6	5	China	female	32	2			
7	6	China	male	44	2			
8	7	Singapore	female	48	2			
9	8	Germany	male	32	2			
10	9	Switzerland	male	70	2			
11	10	Japan	female	25	3			

VLOOKUP can be used too

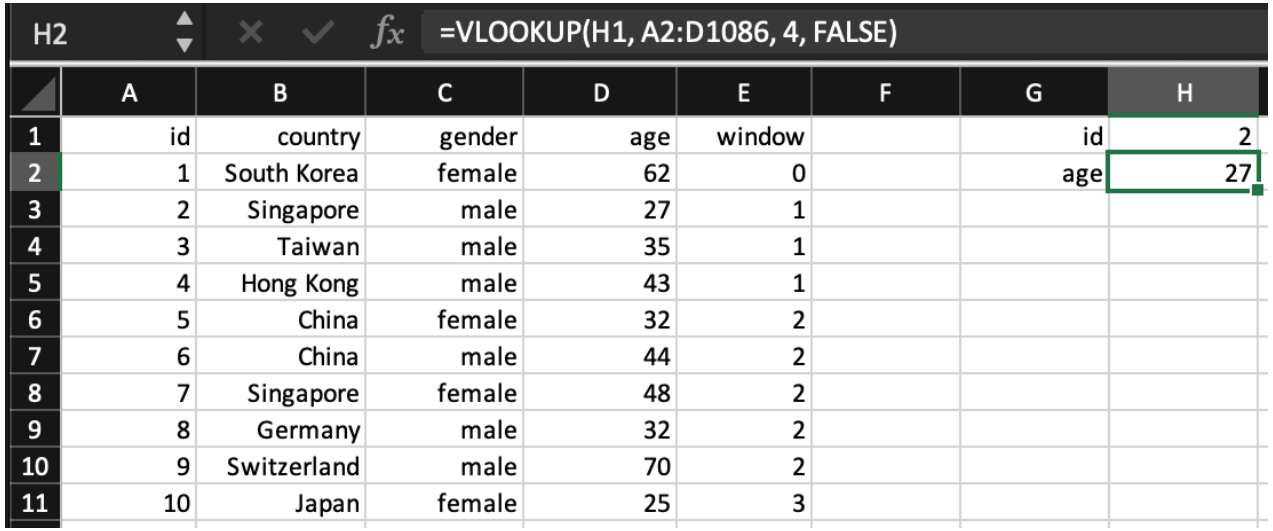
Look up age based upon id:

Enter “id” in Cell G1 and “age” in Cell G2

In Cell H2, input the VLOOKUP function:

“=VLOOKUP(H1, A2: D1086, 4, FALSE)”

- H1: cell to enter id #
- A2: D1086 - vertical search range
- 4: column away from input column
- FALSE: return value when true



	A	B	C	D	E	F	G	H
1	id	country	gender	age	window		id	2
2	1	South Korea	female	62	0		age	27
3	2	Singapore	male	27	1			
4	3	Taiwan	male	35	1			
5	4	Hong Kong	male	43	1			
6	5	China	female	32	2			
7	6	China	male	44	2			
8	7	Singapore	female	48	2			
9	8	Germany	male	32	2			
10	9	Switzerland	male	70	2			
11	10	Japan	female	25	3			

Pivot table

country	(All)	
Row Labels	**Average age**	**Average window**
female	49.63	7.48
male	49.85	8.90
n/a	37.70	5.67
Grand Total	**49.48**	**8.25**

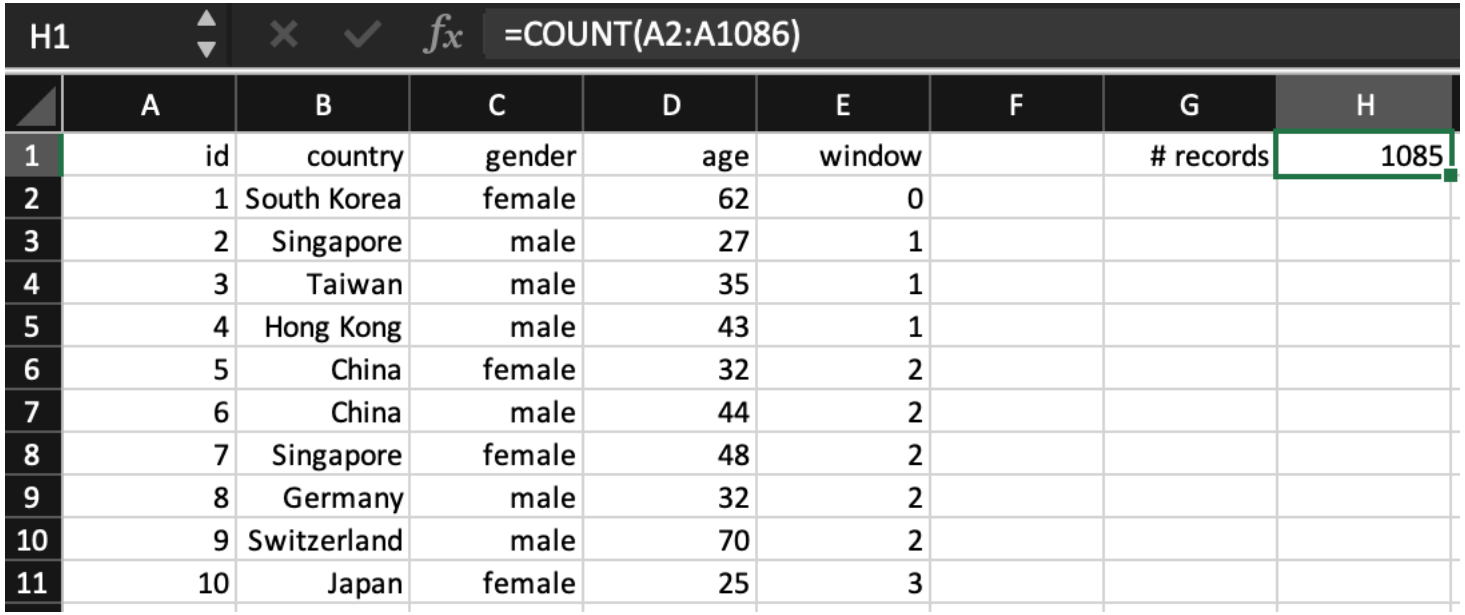
Count

To determine how many cases are there in the data set:

Enter ”# records” in Cell G1

In Cell H1, input the COUNT function: “=COUNT(A2: A1086)”

- A2: A1086: range of id



	A	B	C	D	E	F	G	H
1	id	country	gender	age	window		# records	1085
2	1	South Korea	female	62	0			
3	2	Singapore	male	27	1			
4	3	Taiwan	male	35	1			
5	4	Hong Kong	male	43	1			
6	5	China	female	32	2			
7	6	China	male	44	2			
8	7	Singapore	female	48	2			
9	8	Germany	male	32	2			
10	9	Switzerland	male	70	2			
11	10	Japan	female	25	3			

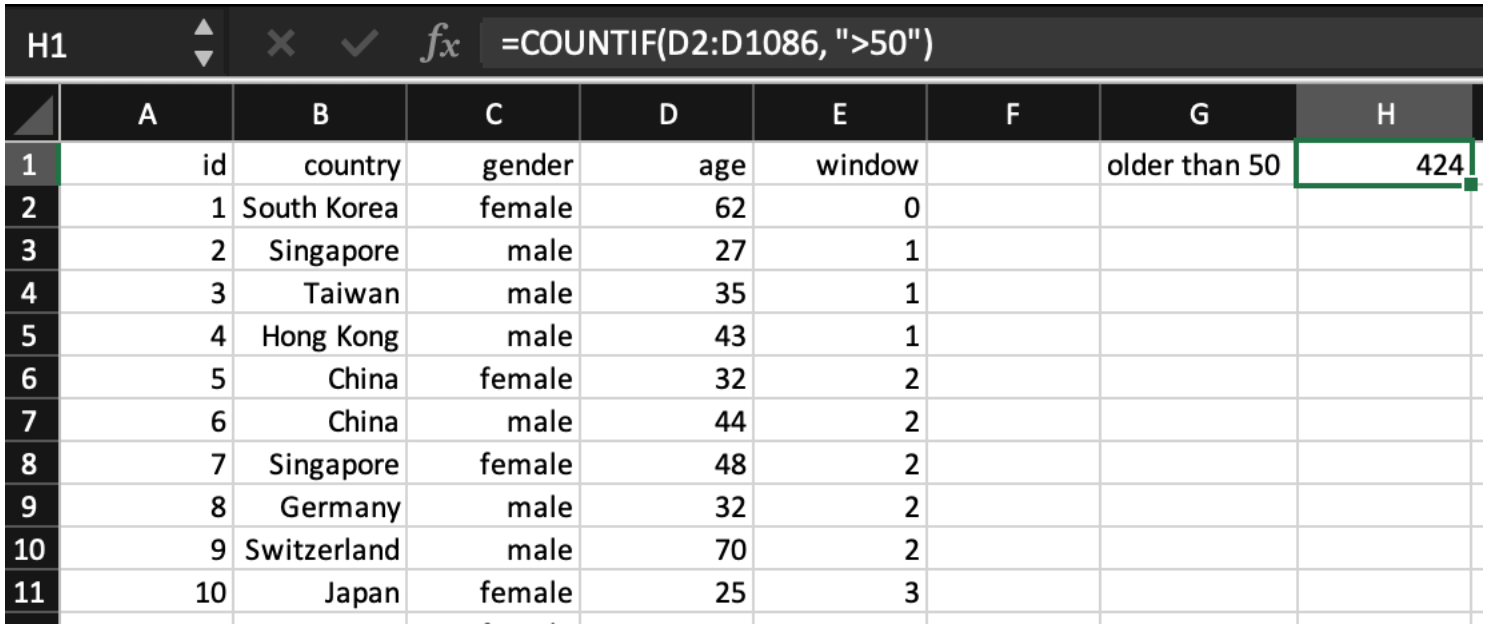
Countif

To determine how many cases are older than 50 years old:

Enter ”older than 50” in Cell G1

In Cell H1, input the COUNTIF function:
“=COUNTIF(D2: D1086, “>50”)”

- D2: D1086: range of age column
- >50: count only cases that are older than 50 years old



	A	B	C	D	E	F	G	H
1	id	country	gender	age	window		older than 50	424
2	1	South Korea	female	62	0			
3	2	Singapore	male	27	1			
4	3	Taiwan	male	35	1			
5	4	Hong Kong	male	43	1			
6	5	China	female	32	2			
7	6	China	male	44	2			
8	7	Singapore	female	48	2			
9	8	Germany	male	32	2			
10	9	Switzerland	male	70	2			
11	10	Japan	female	25	3			

Countifs

To determine how many cases are older than 50 years old with window period more than average of 8 days:

Enter ”older than 50 with window period more than than average of 8 days” in Cell G1

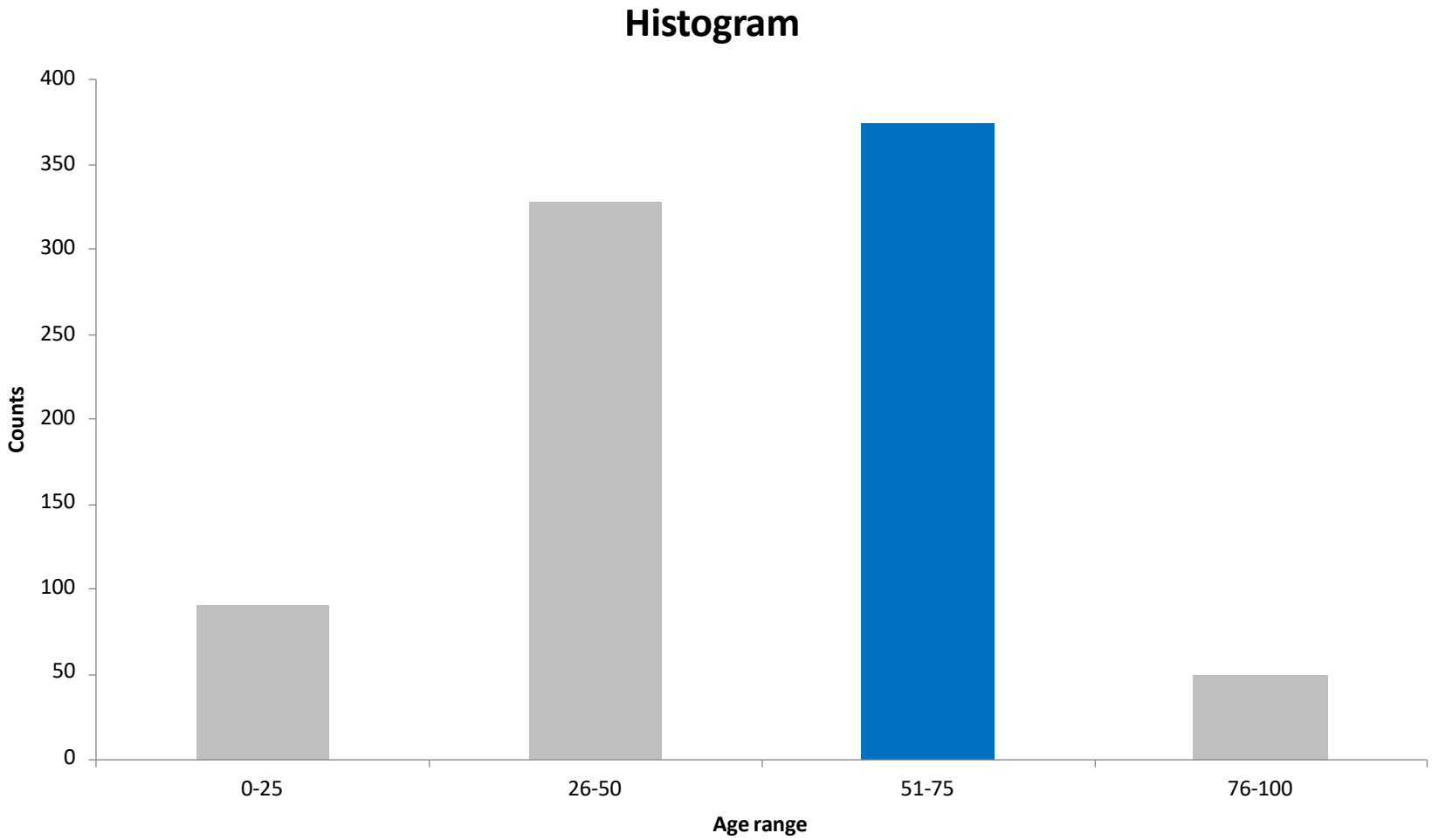
In Cell H2, input the COUNTIFS function: “=COUNTIFS(D2: D1086, “>50”, E2: E1086, “>8”)”

- D2: D1086: range of age column
- >50: count cases that are older than 50 years old
- E2: E1086: range of window column
- >8: count cases that are older than 50 years old with window period more than 8 days

H1 =COUNTIFS(D2:D1086, ">50", E2:E1086, ">8")

	A	B	C	D	E	F	G	H
1	id	country	gender	age	window		older than 50 with average window period more than 8 days	13
2	1	South Korea	female	62	0			
3	2	Singapore	male	27	1			
4	3	Taiwan	male	35	1			
5	4	Hong Kong	male	43	1			
6	5	China	female	32	2			
7	6	China	male	44	2			
8	7	Singapore	female	48	2			
9	8	Germany	male	32	2			
10	9	Switzerland	male	70	2			

Age frequency



Bin	*Frequency*
0-25	91
26-50	328
51-75	374
76-100	50

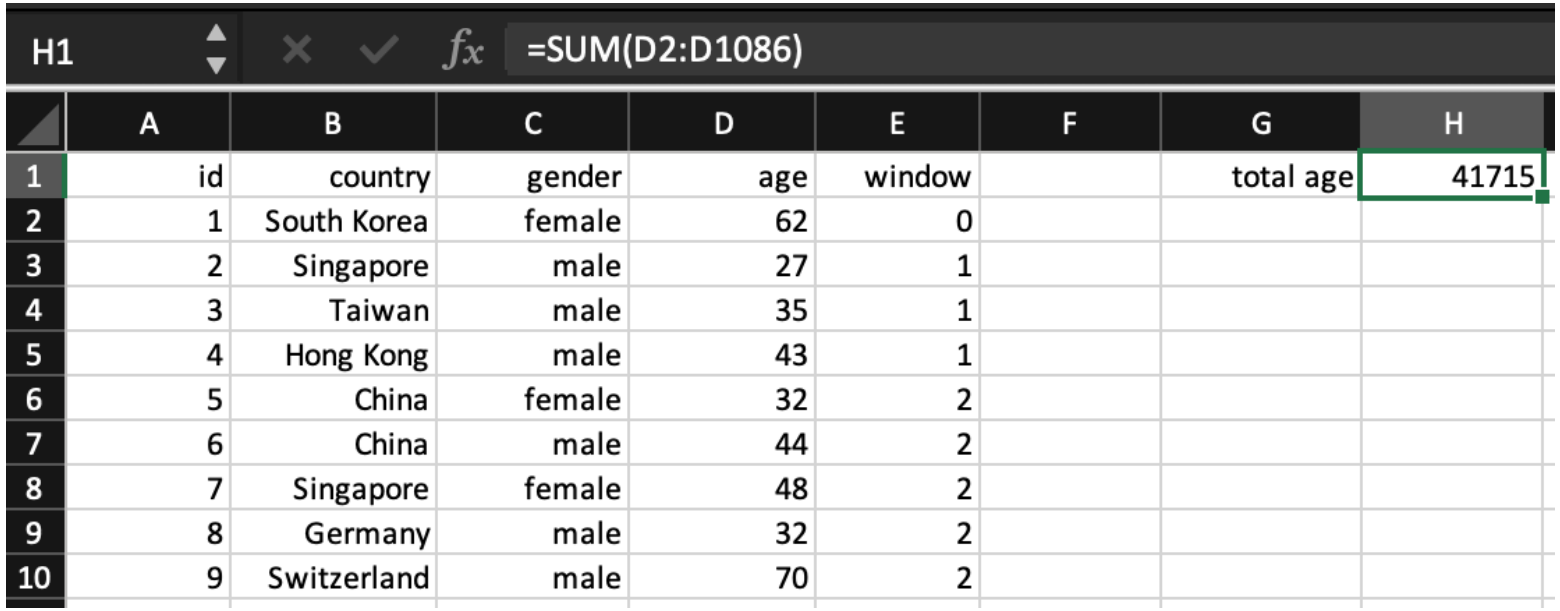
Sum

To determine the total number of age in the age column:

Enter “total age” in Cell G1

In Cell H1, input the SUM function:
“=SUM(D2: D1086)”

- D2: D1086: range of all age



	A	B	C	D	E	F	G	H
1	id	country	gender	age	window		total age	41715
2	1	South Korea	female	62	0			
3	2	Singapore	male	27	1			
4	3	Taiwan	male	35	1			
5	4	Hong Kong	male	43	1			
6	5	China	female	32	2			
7	6	China	male	44	2			
8	7	Singapore	female	48	2			
9	8	Germany	male	32	2			
10	9	Switzerland	male	70	2			

Sumif

To determine total age for cases are older than 51 years old:

Enter ”total age for cases older than 51” in Cell G1

In Cell H1, input the SUMIF function:
“=SUMIF(D2: D1086, “>51”)”

- D2: D1086: range of age column
- >51: total only cases that are older than 51

H1 =SUMIF(D2:D1086, ">51")

	A	B	C	D	E	F	G	H
1	id	country	gender	age	window		total age for cases older than 51	26946
2	1	South Korea	female	62	0			
3	2	Singapore	male	27	1			
4	3	Taiwan	male	35	1			
5	4	Hong Kong	male	43	1			
6	5	China	female	32	2			
7	6	China	male	44	2			
8	7	Singapore	female	48	2			
9	8	Germany	male	32	2			
10	9	Switzerland	male	70	2			
11	10	Japan	female	25	3			

Sumifs

To determine total age between cases who are between 51 to 75:

Enter ”total age between cases who are 51 to 71” in Cell G1

In Cell H1, input the SUMIFS function: “=SUMIFS(D2:D1086, D2:D1086, ">51", D2:D1086, "<75")”

- D2: D1086: range of age column
- >51: count cases that are older than 51
- <75: count cases that are younger than 75

H1 =SUMIFS(D2:D1086, D2:D1086, ">51", D2:D1086, "<75")

	A	B	C	D	E	F	G	H
1	id	country	gender	age	window		total age between cases who are 51 to 75	20019
2	1	South Korea	female	62	0			
3	2	Singapore	male	27	1			
4	3	Taiwan	male	35	1		51 - 75	374
5	4	Hong Kong	male	43	1			
6	5	China	female	32	2		average age of cases between 51 - 75	53.5
7	8	Germany	male	32	2			
8	6	China	male	44	2			
9	7	Singapore	female	48	2			
10	9	Switzerland	male	70	2			
11	10	Japan	female	25	3			

When total age between 51 to 75 is determined, divide by the number of cases in the range of 51 to 75 to determine the average age for the group

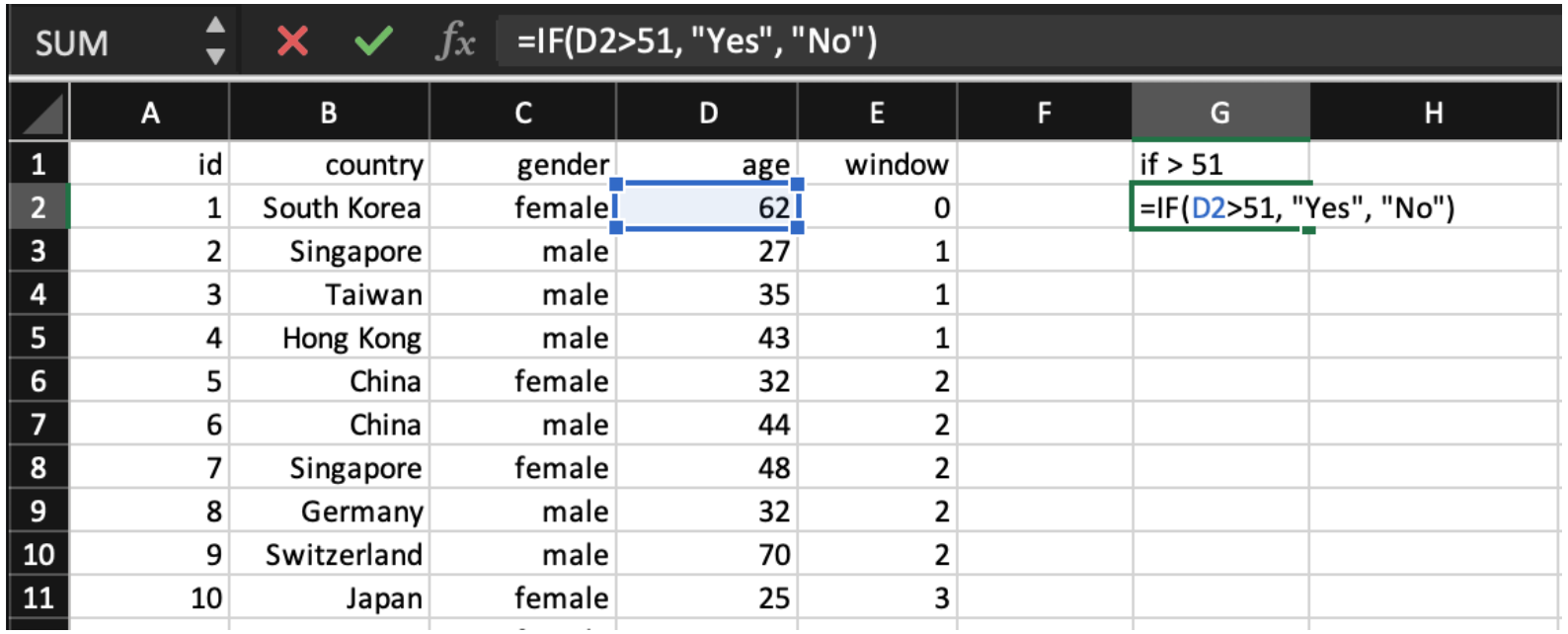
IF

To determine if a case is older than 51 years old:

Enter ”if > 51” in Cell G1

In Cell G2, input the IF function “=IF(D2>51, “Yes”, ”No”)”

- D2: age of id case 1
- >51: check if id case age is greater than 51
- Yes: if id case age is greater than 51, then display “Yes”
- No: if id case age is not greater than 51, then display ”No”



	A	B	C	D	E	F	G	H
1	id	country	gender	age	window		if > 51	
2	1	South Korea	female	62	0		=IF(D2>51, "Yes", "No")	
3	2	Singapore	male	27	1			
4	3	Taiwan	male	35	1			
5	4	Hong Kong	male	43	1			
6	5	China	female	32	2			
7	6	China	male	44	2			
8	7	Singapore	female	48	2			
9	8	Germany	male	32	2			
10	9	Switzerland	male	70	2			
11	10	Japan	female	25	3			

AND

Determine whether id case is older than 51 years old and has more than 8 days of window:

Enter ”> 51 and > 8 days” in Cell H1

In Cell H2, input the AND function: “=AND(D2>51, E2>8)”

- D2: age of id case 1
- >51: check if id case is greater than 51
- E2: window of id case 1
- >8: check if id case is greater than 8 days
- Return “TRUE” when both conditions are filled, other wise, return “FALSE”

SUM ✕ ✓ *fx* =AND(D2>51, E2>8)

	A	B	C	D	E	F	G	H	I
1	id	country	gender	age	window		if > 51	> 51 and > 8 days	
2	1	South Korea	female	62	0		Yes	=AND(D2>51, E2>8)	
3	2	Singapore	male	27	1				
4	3	Taiwan	male	35	1				
5	4	Hong Kong	male	43	1				
6	5	China	female	32	2				
7	6	China	male	44	2				
8	7	Singapore	female	48	2				
9	8	Germany	male	32	2				
10	9	Switzerland	male	70	2				
11	10	Japan	female	25	3				

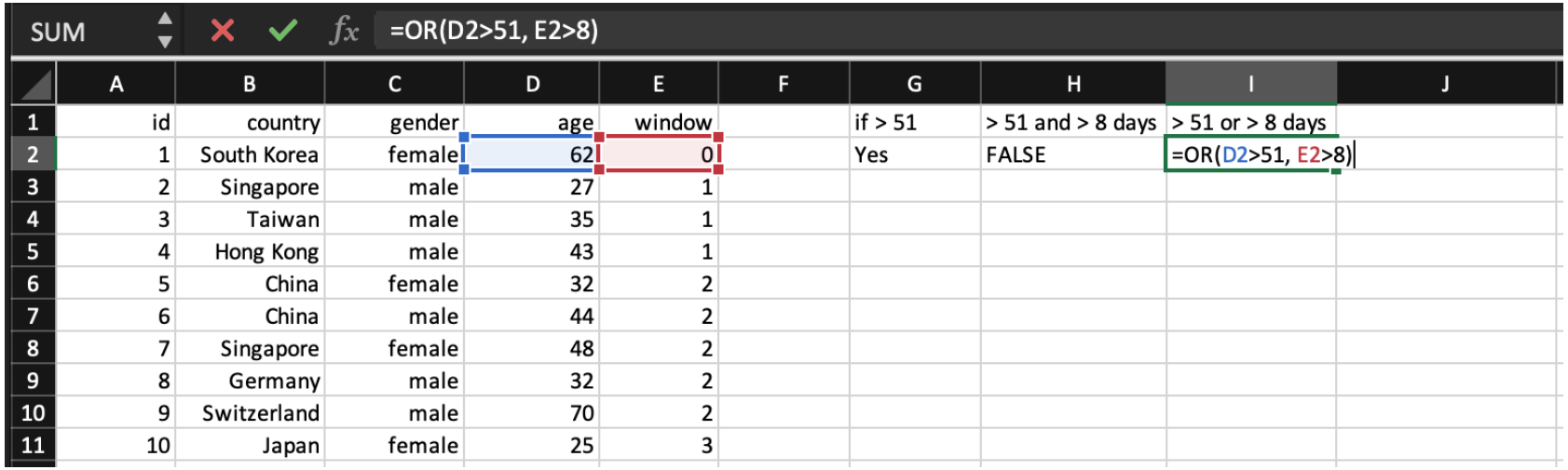
OR

Determine whether id case is older than 51 years old or has more than 8 days of window:

Enter ”> 51 or > 8 days” in Cell I1

In Cell I2, input the OR function:
“=OR(D2>51, E2>8)”

- D2: age of id case 1
- >51: check if id case is greater than 51
- E2: window of id case 1
- >8: check if id case is greater than 8 days
- Return “TRUE” when either condition is filled, other wise, return “FALSE”



	A	B	C	D	E	F	G	H	I	J
1	id	country	gender	age	window		if > 51	> 51 and > 8 days	> 51 or > 8 days	
2	1	South Korea	female	62	0		Yes	FALSE	=OR(D2>51, E2>8)	
3	2	Singapore	male	27	1					
4	3	Taiwan	male	35	1					
5	4	Hong Kong	male	43	1					
6	5	China	female	32	2					
7	6	China	male	44	2					
8	7	Singapore	female	48	2					
9	8	Germany	male	32	2					
10	9	Switzerland	male	70	2					
11	10	Japan	female	25	3					

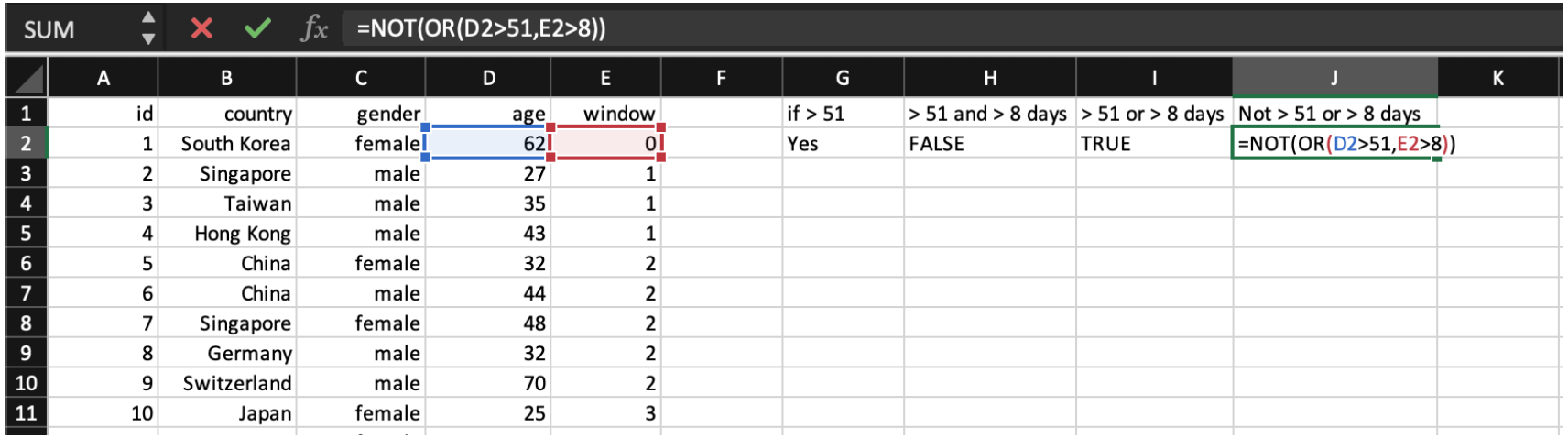
NOT

Determine whether id case is not older than 51 years old or has more than 8 days of window:

Enter ”Not > 51 or > 8 days” in Cell J1

In Cell J2, input the NOT function:
“=NOT(OR(D2>51, E2>8))”

- D2: age of id case 1
- >51: check if id case is greater than 51
- E2: window of id case 1
- >8: check if id case is greater than 8 days
- Return “FALSE” when either condition is filled, other wise, return “TRUE”



	A	B	C	D	E	F	G	H	I	J	K
1	id	country	gender	age	window		if > 51	> 51 and > 8 days	> 51 or > 8 days	Not > 51 or > 8 days	
2	1	South Korea	female	62	0		Yes	FALSE	TRUE	=NOT(OR(D2>51,E2>8))	
3	2	Singapore	male	27	1						
4	3	Taiwan	male	35	1						
5	4	Hong Kong	male	43	1						
6	5	China	female	32	2						
7	6	China	male	44	2						
8	7	Singapore	female	48	2						
9	8	Germany	male	32	2						
10	9	Switzerland	male	70	2						
11	10	Japan	female	25	3						

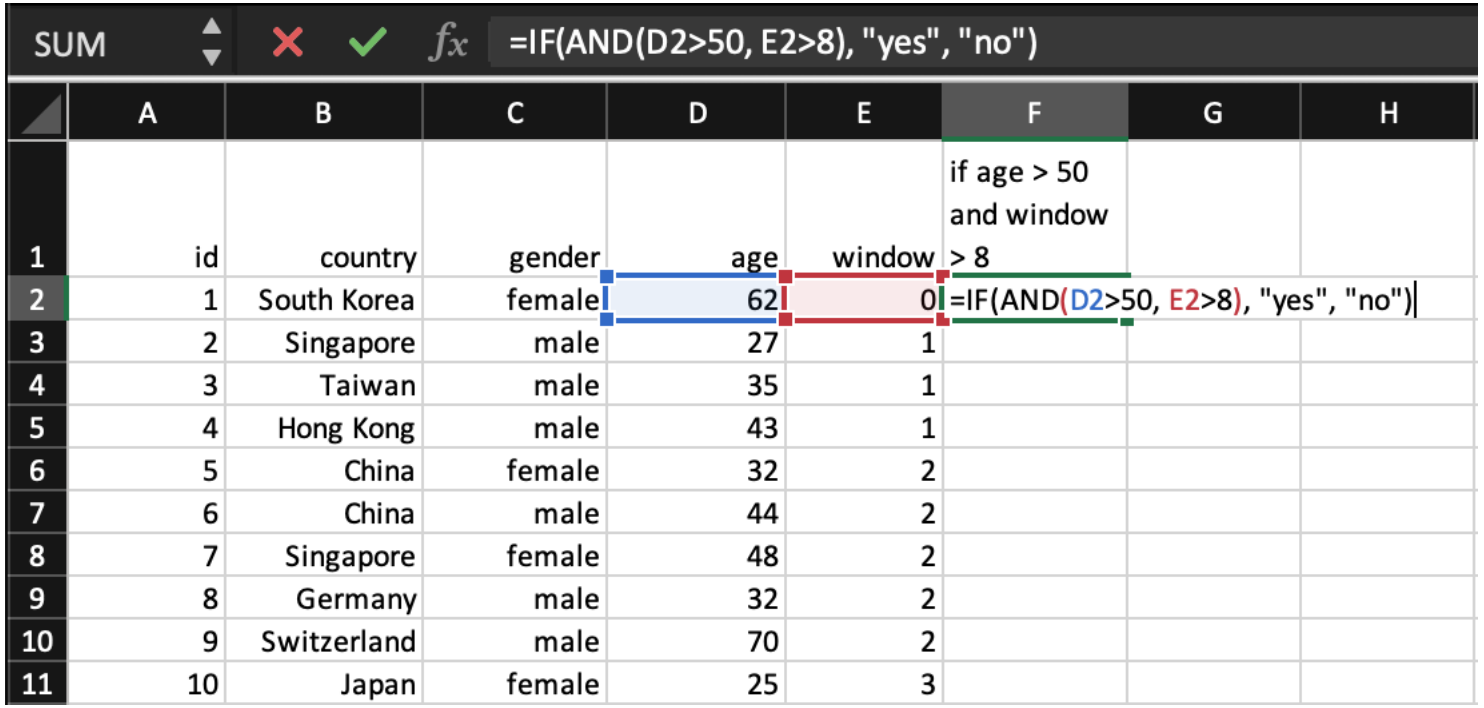
IF/AND

To determine if a case is older than 50 years old and has greater than 8 days of window:

Enter ”if > 50 and window >8” in Cell F1

In Cell F2, input the IF/AND function:
“=IF(AND(D2>50, E2>8), “yes”, ”no”)

- D2: age of id case 1
- >50: check if id case is greater than 50
- E2: window of id case 1
- >8: check if id case is greater than 8
- yes: if both conditions are true, then “yes”
- no: if both conditions are false, then”no”



	A	B	C	D	E	F	G	H
1	id	country	gender	age	window	if age > 50 and window > 8		
2	1	South Korea	female	62	0	=IF(AND(D2>50, E2>8), "yes", "no")		
3	2	Singapore	male	27	1			
4	3	Taiwan	male	35	1			
5	4	Hong Kong	male	43	1			
6	5	China	female	32	2			
7	6	China	male	44	2			
8	7	Singapore	female	48	2			
9	8	Germany	male	32	2			
10	9	Switzerland	male	70	2			
11	10	Japan	female	25	3			

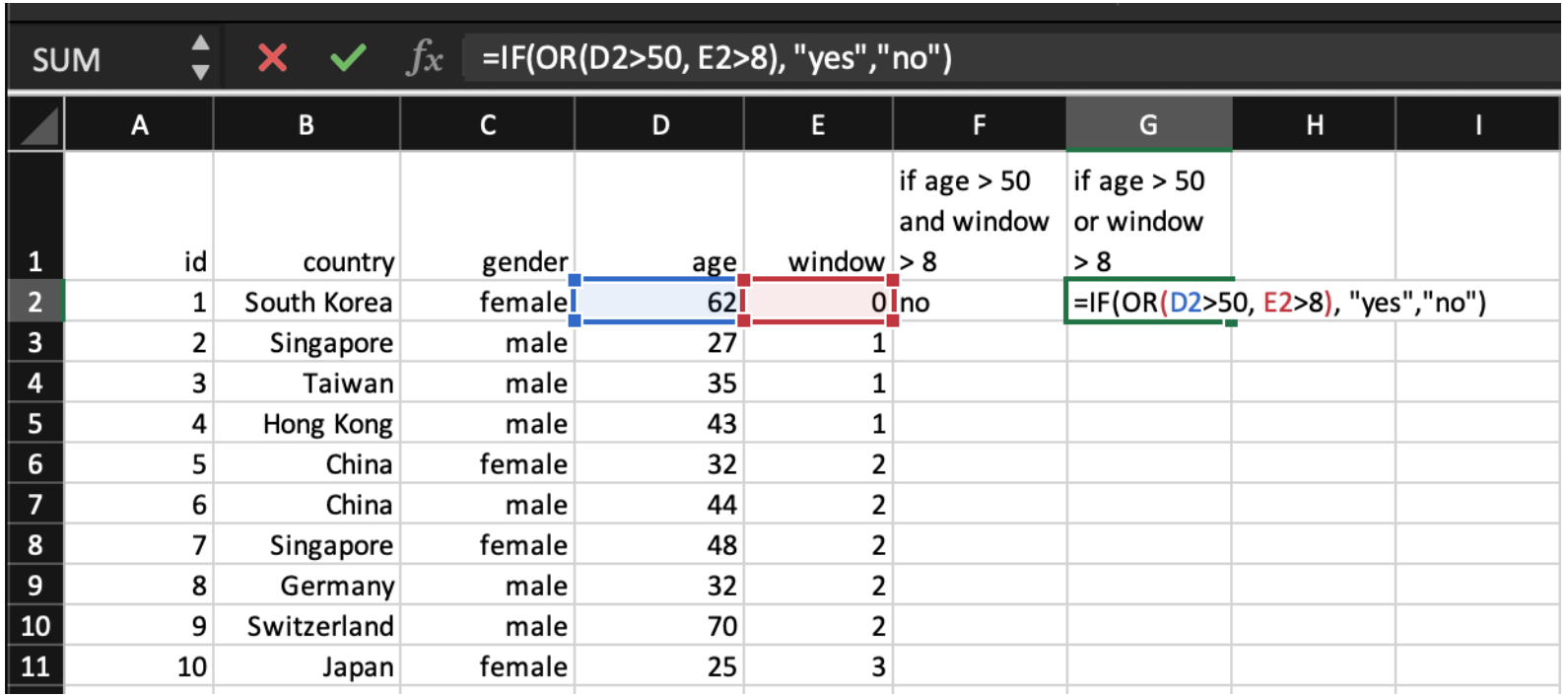
IF/OR

To determine if a case is older than 50 years old or has greater than 8 days of window:

Enter ”if > 50 or window >8” in Cell G1

In Cell G2, input the IF/OR function:
“=IF(OR(D2>50, E2>8), “yes”, ”no”)

- D2: age of id case 1
- >50: check if id case is greater than 50
- E2: window of id case 1
- >8: check if id case 1 is greater than 8
- yes: if either conditions is filled, then “yes”
- no: if both conditions are not filled, then ”no”



	A	B	C	D	E	F	G	H	I
1	id	country	gender	age	window	if age > 50 and window > 8	if age > 50 or window > 8		
2	1	South Korea	female	62	0	no	=IF(OR(D2>50, E2>8), "yes","no")		
3	2	Singapore	male	27	1				
4	3	Taiwan	male	35	1				
5	4	Hong Kong	male	43	1				
6	5	China	female	32	2				
7	6	China	male	44	2				
8	7	Singapore	female	48	2				
9	8	Germany	male	32	2				
10	9	Switzerland	male	70	2				
11	10	Japan	female	25	3				

IF/NOT

To determine if a case is not older than 50 years old:

Enter ”if age not greater than 50” in Cell H1

In Cell H2, input the IF/AND function: “=IF(NOT(D2>50), “yes”, ”no”)”

- D2: age of id case 1
- >50: check if id case is greater than 50
- yes: if id case age is not greater than 50, then display “yes”
- no: if id case age is greater than 50, then display ”no”

SUM ✕ ✓ *fx* =IF(NOT(D2>50), "yes", "no")

	A	B	C	D	E	F	G	H	I	J
1	id	country	gender	age	window	if age > 50 and window > 8	if age > 50 or window > 8	if age not greater than 50		
2	1	South Korea	female	62	0	no	yes	=IF(NOT(D2>50), "yes", "no")		
3	2	Singapore	male	27	1					
4	3	Taiwan	male	35	1					
5	4	Hong Kong	male	43	1					
6	5	China	female	32	2					
7	6	China	male	44	2					
8	7	Singapore	female	48	2					
9	8	Germany	male	32	2					
10	9	Switzerland	male	70	2					
11	10	Japan	female	25	3					

Hands-on Exercise

Suppose you are a HR specialist and your supervisor, who is the HR director just gave you the baltimore-city-employee-salaries-fy2019-1.xlsx file:

1. Create a VLOOKUP approximate match function to categorize annual salary level based on the following table. What are the levels for annual salaries of $98765 and $51230

Annual salary	Level
1500	Entry
68000	Experienced
140000	Management
280000	Executive

2. Ennis called you to see what his hire date is while the HR director emailed you to see what department and job are Diane in. Create Index Match functions that allow you to input the employid to retrieve the name, job title, department, hire date, annual salary and gross salary. Given that Ennis's employee ID is A12393 and Diane's employee ID is A12367, what is Ennis's hire date? what department and job are Diane working in?

3. As the fiscal year is coming to an end, you are asked to provide head counts based upon the annual salary level from Question 1 for budget planning. Using COUNTIF and COUNTIFS, how many employees are in the Entry, Experienced, Management and Executive Level?

4. What's the IF function that allows you to return "yes" for whether the employee is entry level, if not, returns "no"? Use the annual salary for Entry Level employee from Question 1 table for the function.

https://data.world/baltimore/6xv6-e66h

http://freewillystockpickerblog.blogspot.com/2013/06/are-we-there-yet-are-we-there-yet-on.html

In the End

Functions allow users to:

1. View a specific value in a range or array (Lookups)
2. Count or sum values based upon criteria (Countif, Sumif)
3. Compare conditions (Logical)

Questions?

Visit the QCL at Kravis Lower Court or email us at qcl@cmc.edu