MICROSOFT EXCEL PART 2

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BEFORE WE START

- Download Microsoft 360
  - https://www.microsoft.com/en-us/education/products/office
- Survey sign-in
- Github link
  - https://github.com/CMC-QCL/Excel_2

AGENDA

Pivot Tables

- Set Up
- Use

Lookup functions

- VLOOKUP (approximate match)
- Index Match

Common functions

- Count
- Sum

Logical functions

- 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

EXCEL 1 CONTENT

Content

- Sort, filter, conditional formatting
- VLOOKUP (exact match)
- Calculations (mean, min and max)
- Frequency and histogram

TODAY'S GOALS

- ❑ A quicker way to look at data with **Pivot Table and Pivot Chart**
- ❑ Make a simple search table with **VLOOKUP (approximate match)**
- ❑ Search your data using Index Match
- ❑ Use **Common functions** on your data
- ❑ Use **Logical functions** on your data

Insert Pivot Table

Create Pivot table that filters by country and shows shows age by gender:

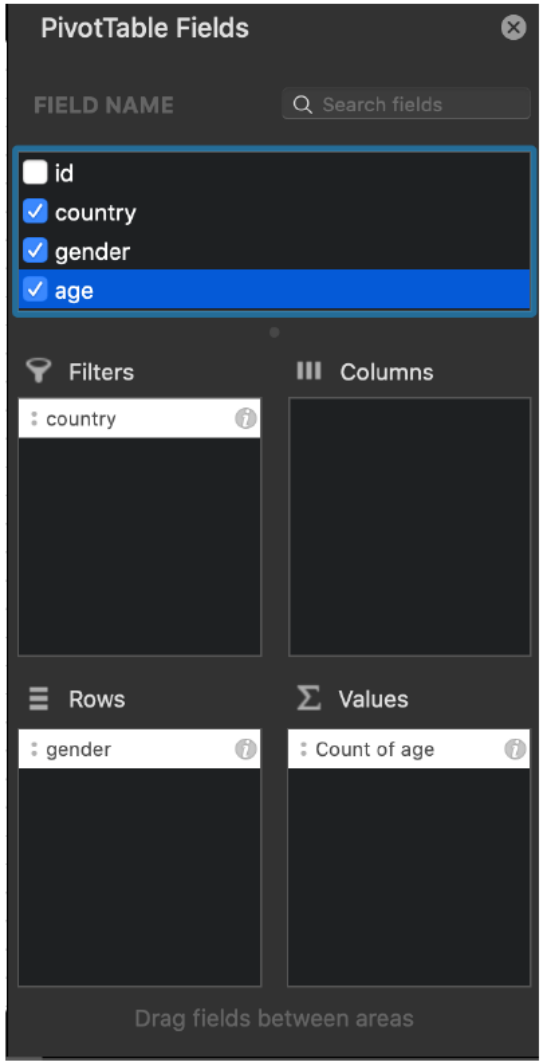
Click on any cells in the data set

Under Insert, select Pivot Table

When Create PivotTable box appears, default is new worksheet, so click OK

Pivot Table Fields pane then appear, drag the following into different areas:

- Country to the Filter area
- Gender to the Rows area
- Age to the Values area



	A	B
1	country	(All)
2		
3	**Row Labels**	**Count of age**
4	female	382
5	male	519
6	n/a	184
7	**Grand Total**	**1085**

Pivot Table: summary calculation

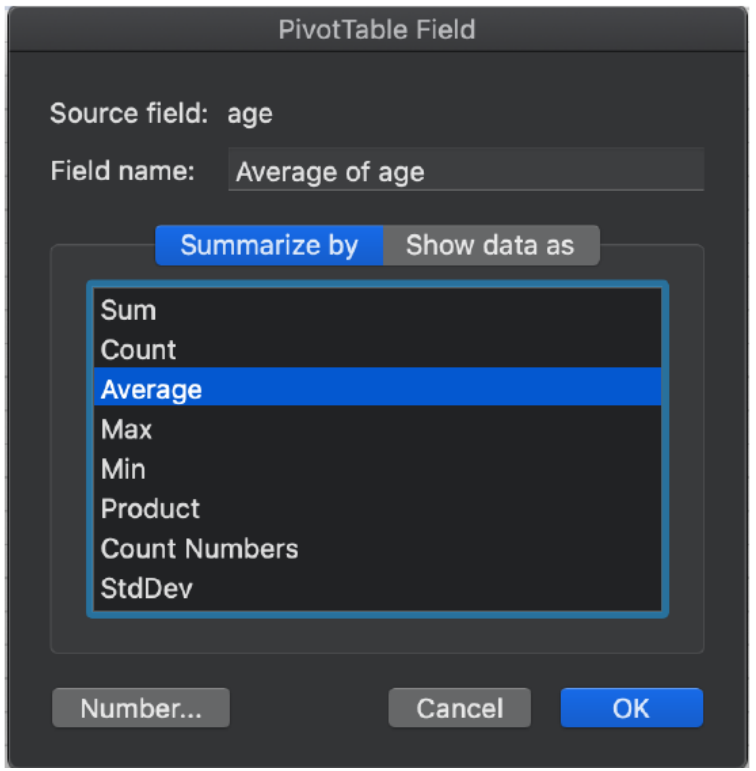
Change summary calculation by:

Click on any cell in the Count of age Column

Change the type of calculation by right-click and select Value Field Settings

When the PivotTable Field pane opens, select Average and click OK

	A	B
1	country	(All)
2		
3	**Row Labels**	**Count of age**
4	female	382
5	male	519
6	n/a	184
7	**Grand Total**	**1085**

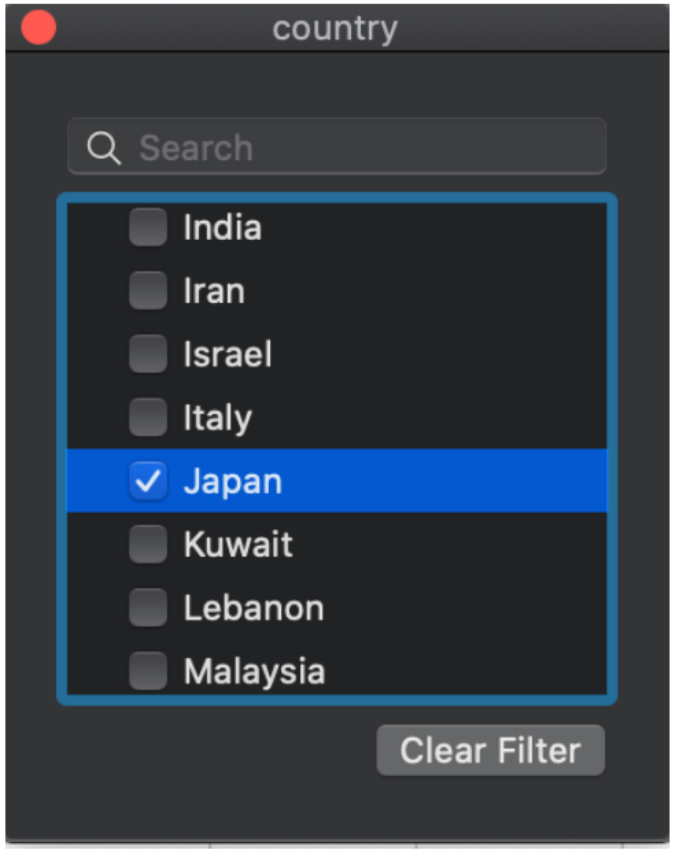


	A	B
1	country	(All)
2		
3	**Row Labels**	**Average of age**
4	female	49.63
5	male	49.85
6	n/a	37.70
7	**Grand Total**	**49.48**

Pivot Table: Filter

Since Country field is added to the Filters area, the pivot table can filter by country

To apply filter to show only Japan, click the filter drop down and select Japan



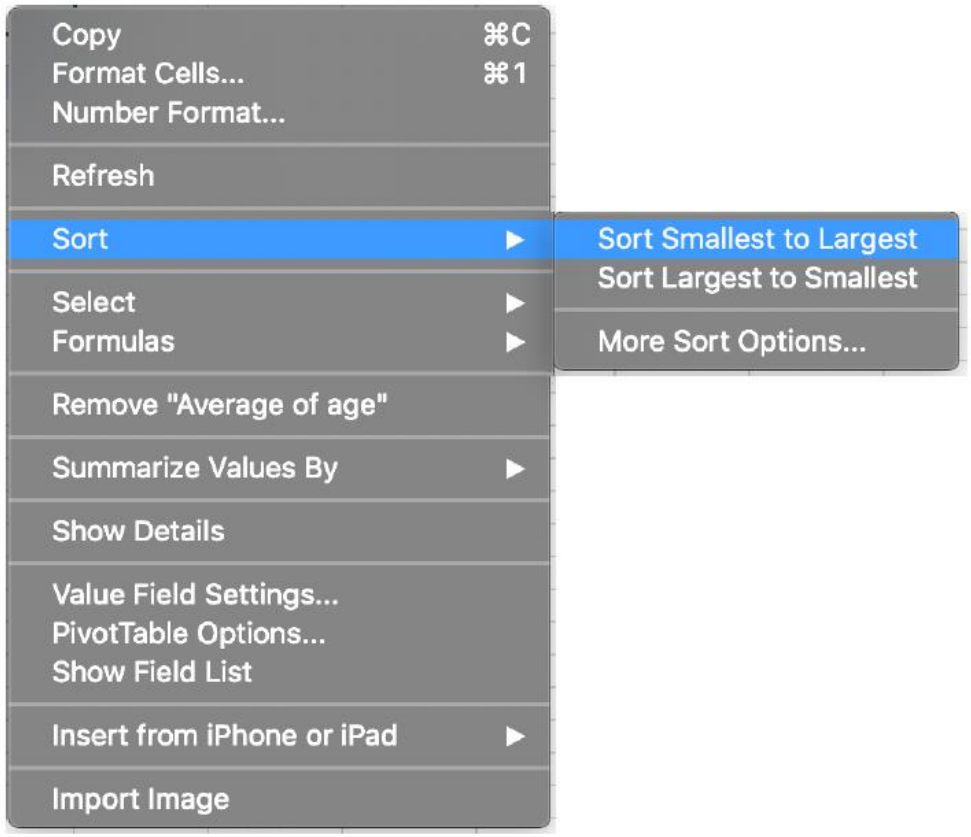
	A	B
1	country	Japan
2		
3	Row Labels	Average of age
4	n/a	5.00
5	female	54.00
6	male	56.65
7	Grand Total	55.46

Pivot Table: Sort

To sort Average of age in Pivot table:

Click on any cell in the Average of age Column

Right click and select Sort, then click on Sort Smallest to Largest



	A	B
1	country	(All)
2		
3	**Row Labels**	**Average of age**
4	n/a	37.70
5	female	49.63
6	male	49.85
7	**Grand Total**	**49.48**

PivotChart

Create Pivot table with chart that filters by country and shows shows gender by age:

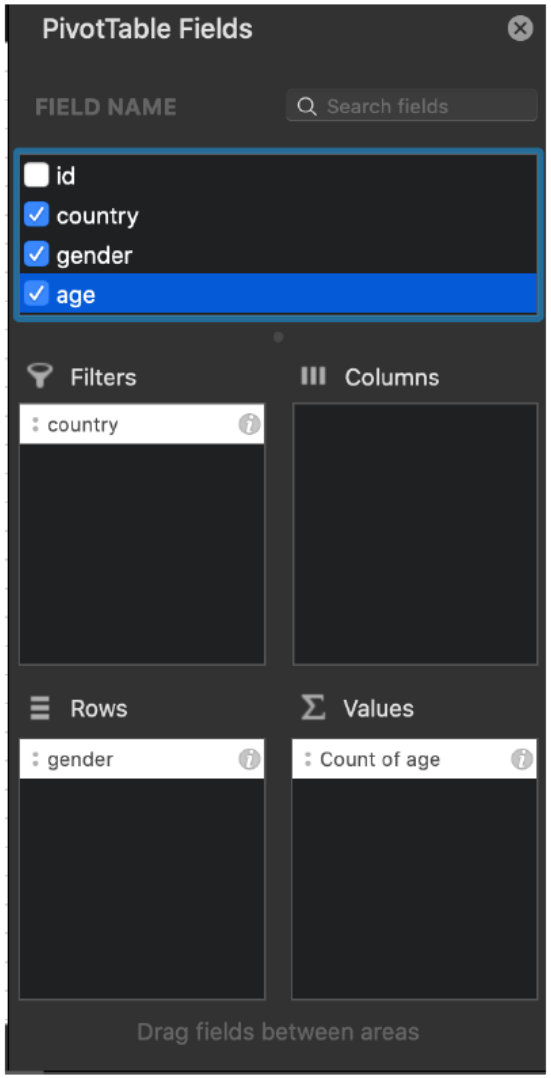
Click on any cells in the data set

Under Insert, select Pivot Chart

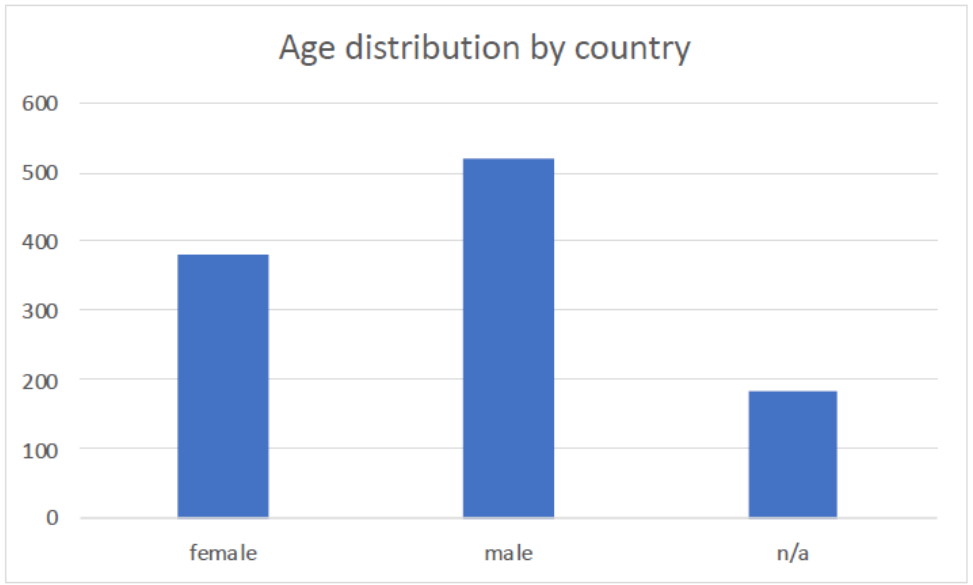
When Create PivotTable box appears, default is new worksheet, so click OK

Pivot Table Fields pane then appear, drag the following into different areas:

- Country to the Filter area
- Gender to the Rows area
- Age to the Values area



	A	B
1	country	(All)
2		
3	Row Labels	Count of age
4	female	382
5	male	519
6	n/a	184
7	Grand Total	1085



HANDS-ON EXERCISE #1

Using the baltimore-city-employee-salaries-fy2019-1.xlsx file:

Build a pivot table that is filterable by department to show the name and ID of each employee. With the table, answer the following questions:

a. Dominic Bullock works in the City Council department, what is their ID?

b. How many employees work in the Election department?

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

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			

HANDS-ON EXERCISE #2

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:

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
$ 50,000	Entry
$ 80,000	Experienced
$ 100,000	Management
$ 280,000	Executive

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

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			

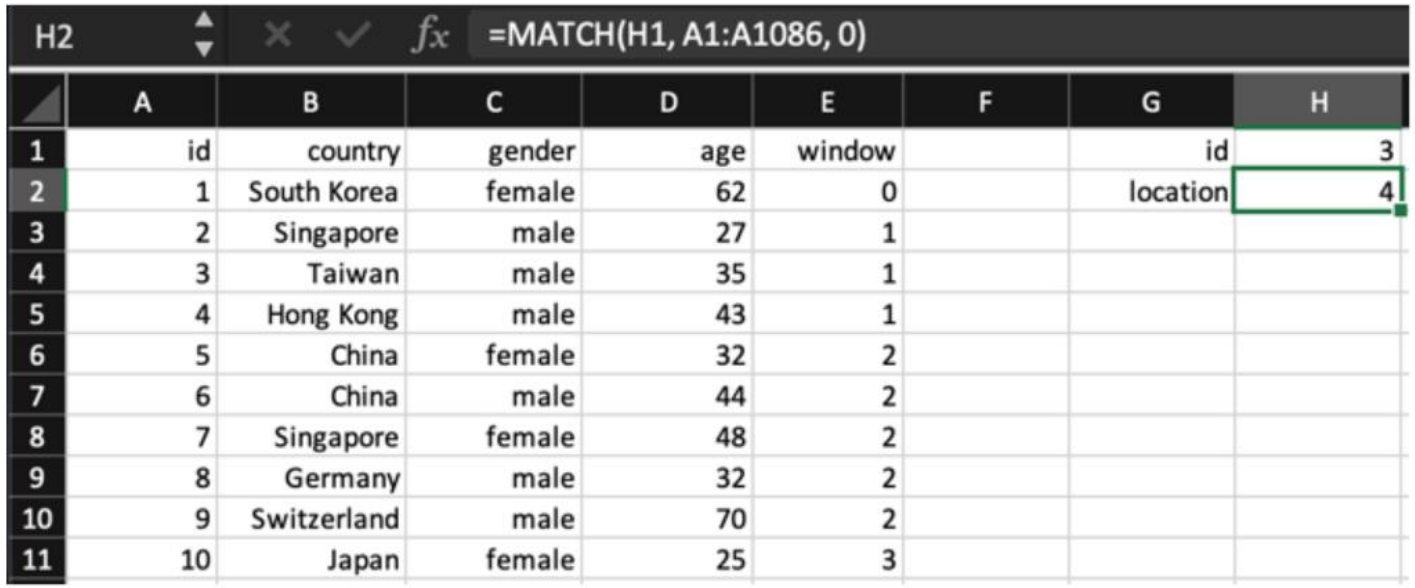
Match

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)

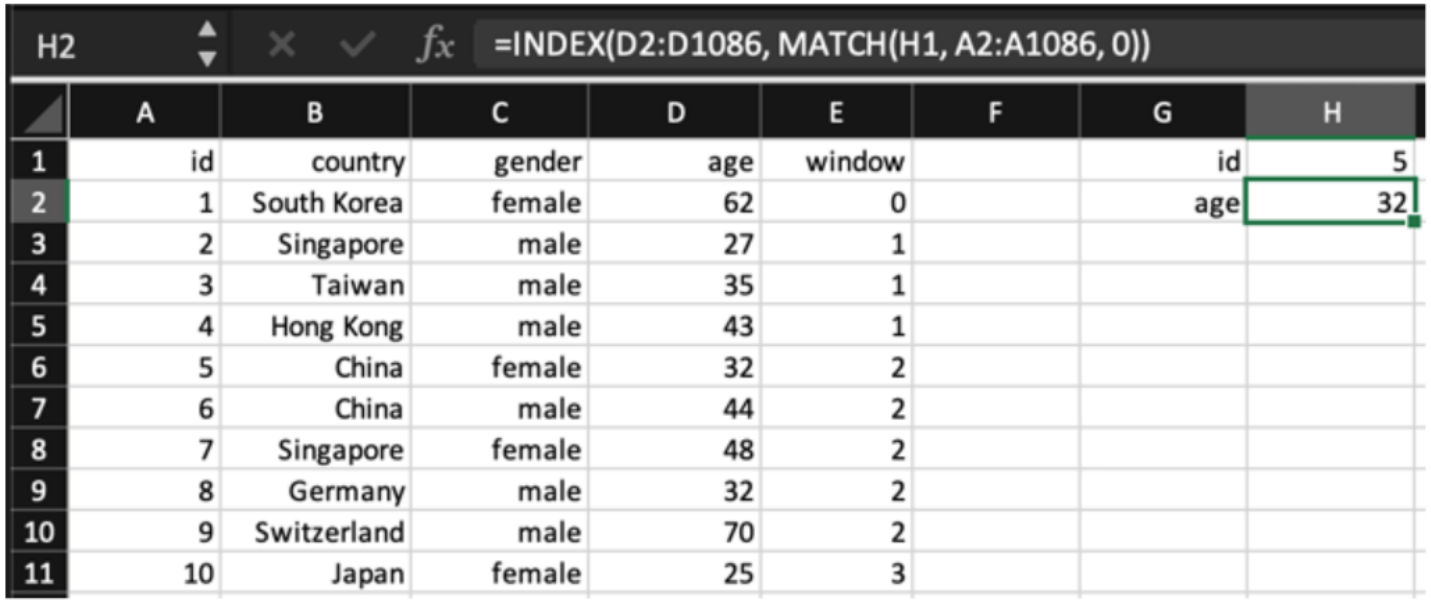
Look up age based upon id:

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			

HANDS-ON EXERCISE #3

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:

Ennis called you to see what his hire date is.

Create Index Match functions that allow you to input the employid to retrieve the name, hire date.

Given that Ennis's employee ID is A12393, what is Ennis's hire date?

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

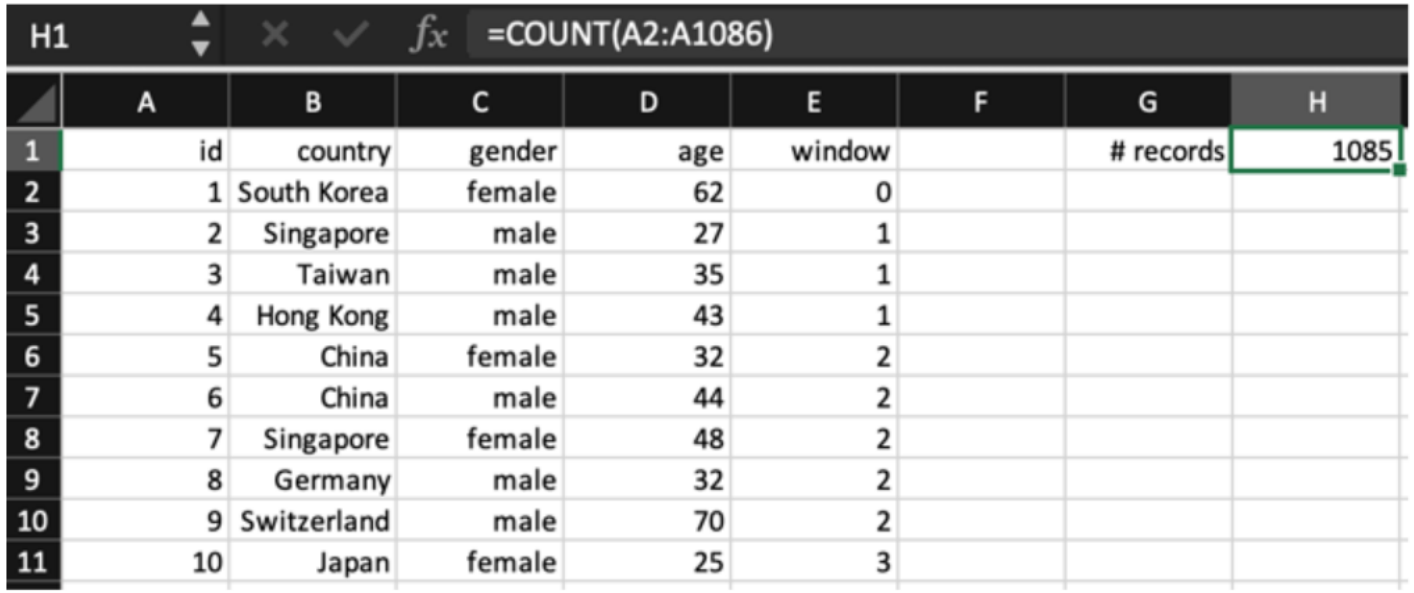
Count

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

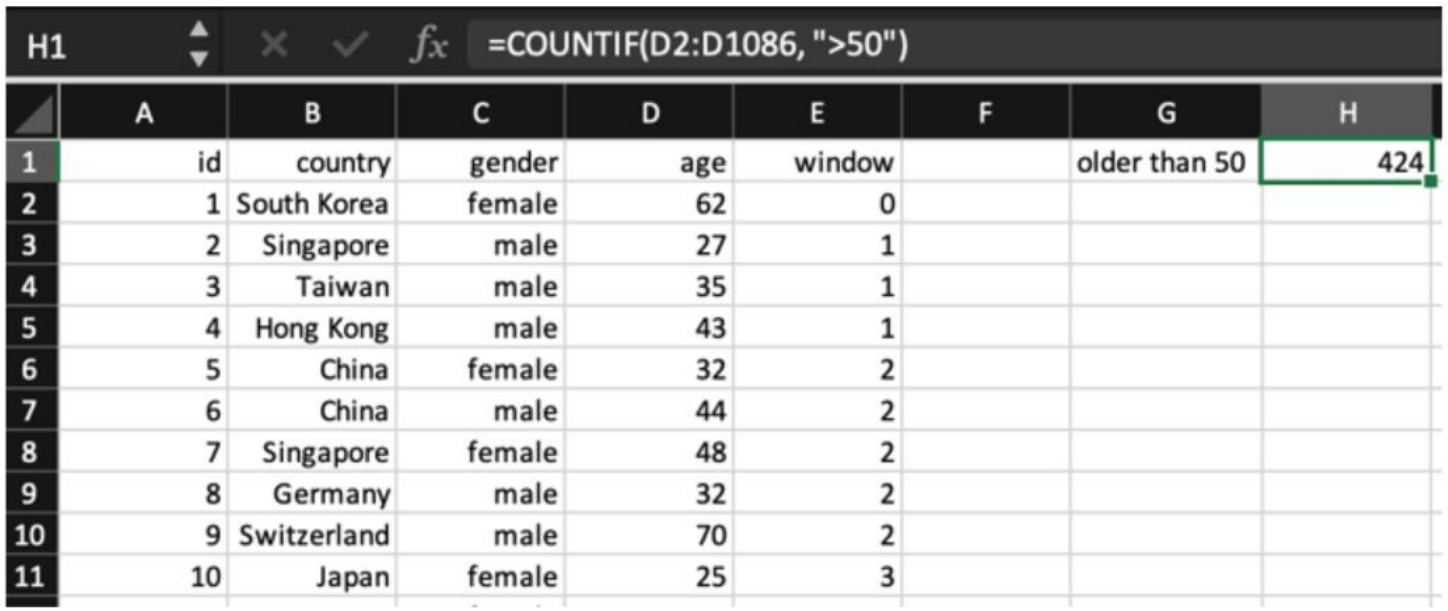
To determine how many cases are older than 50 years old:

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			

HANDS-ON EXERCISE #4

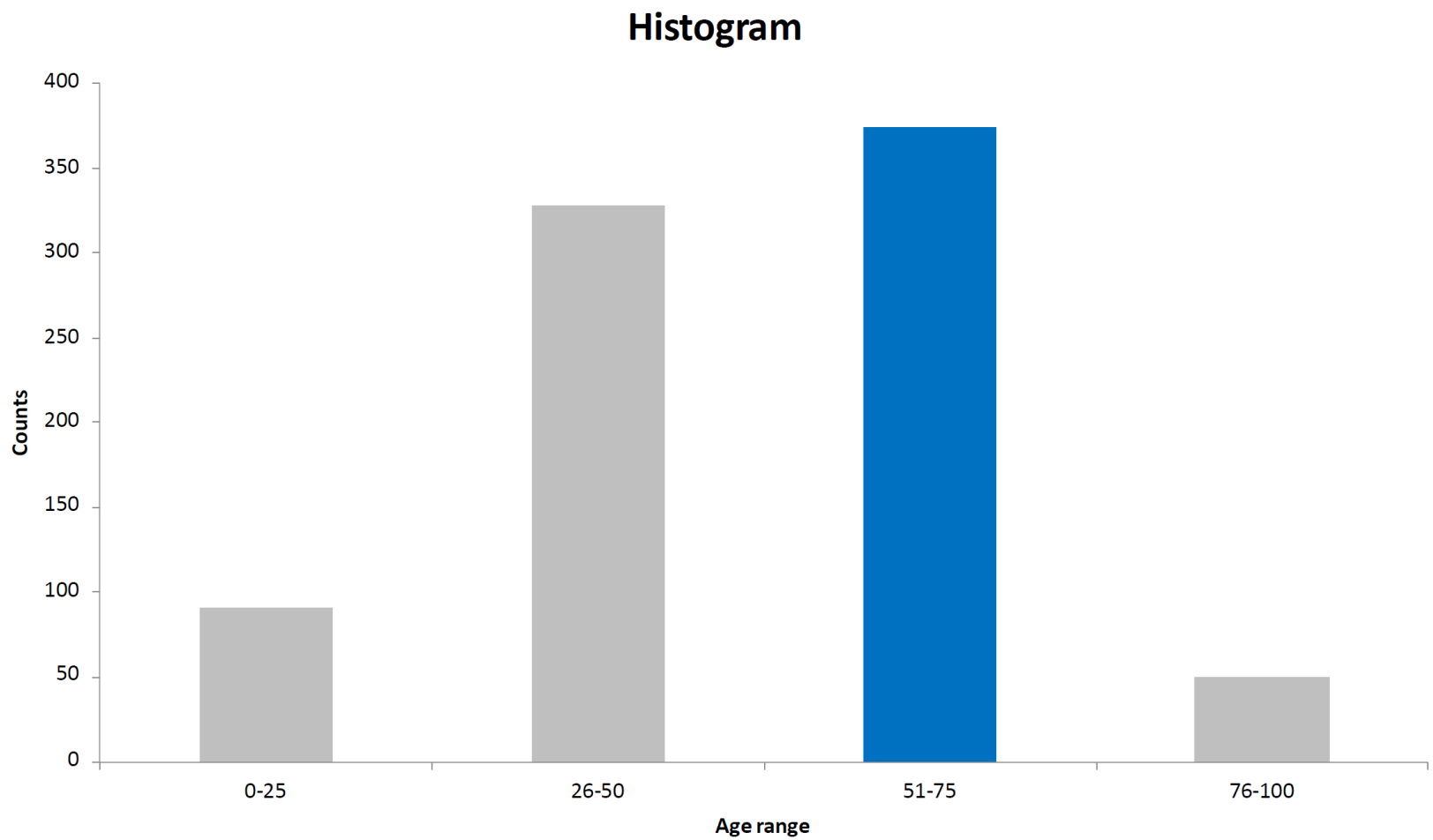
Suppose you are a HR specialist and your supervisor, who is the HR director just gave you the baltimore-city-employee-salaries-fy2019-1.xlsx file:

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, how many employees are in the Entry?

Annual Salary	Level
$ 50,000	Entry
$ 80,000	Experienced
$ 100,000	Management
$ 280,000	Executive

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

Age frequency



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

Sum

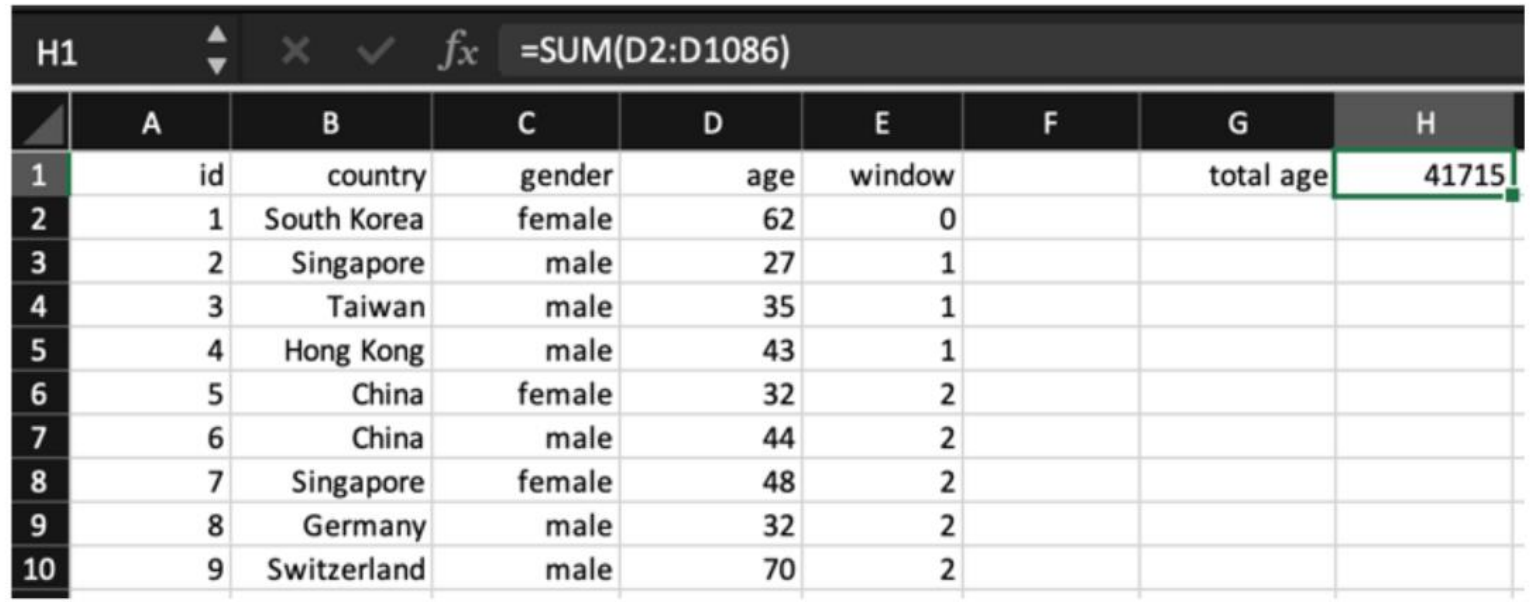
To determine the total number of age in the age column:

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			

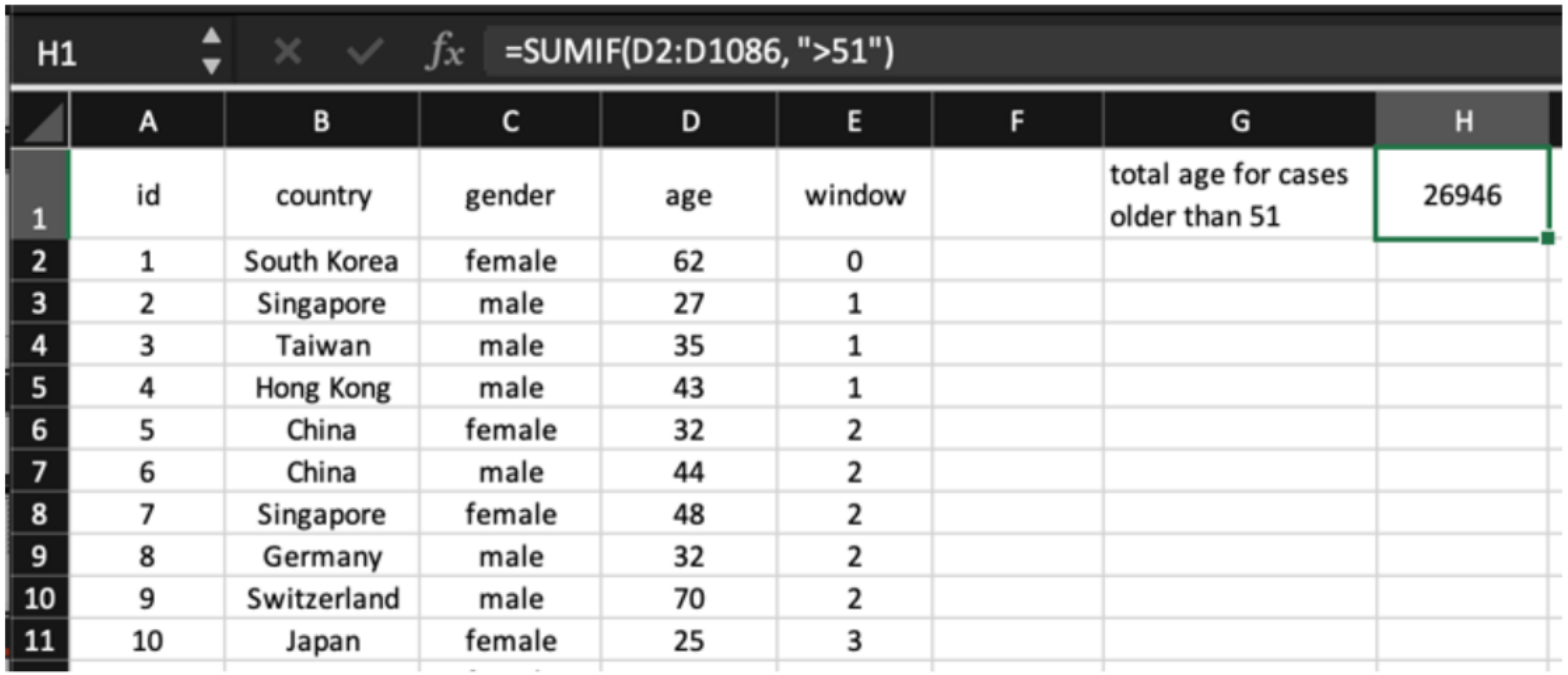
Sumif

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



	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

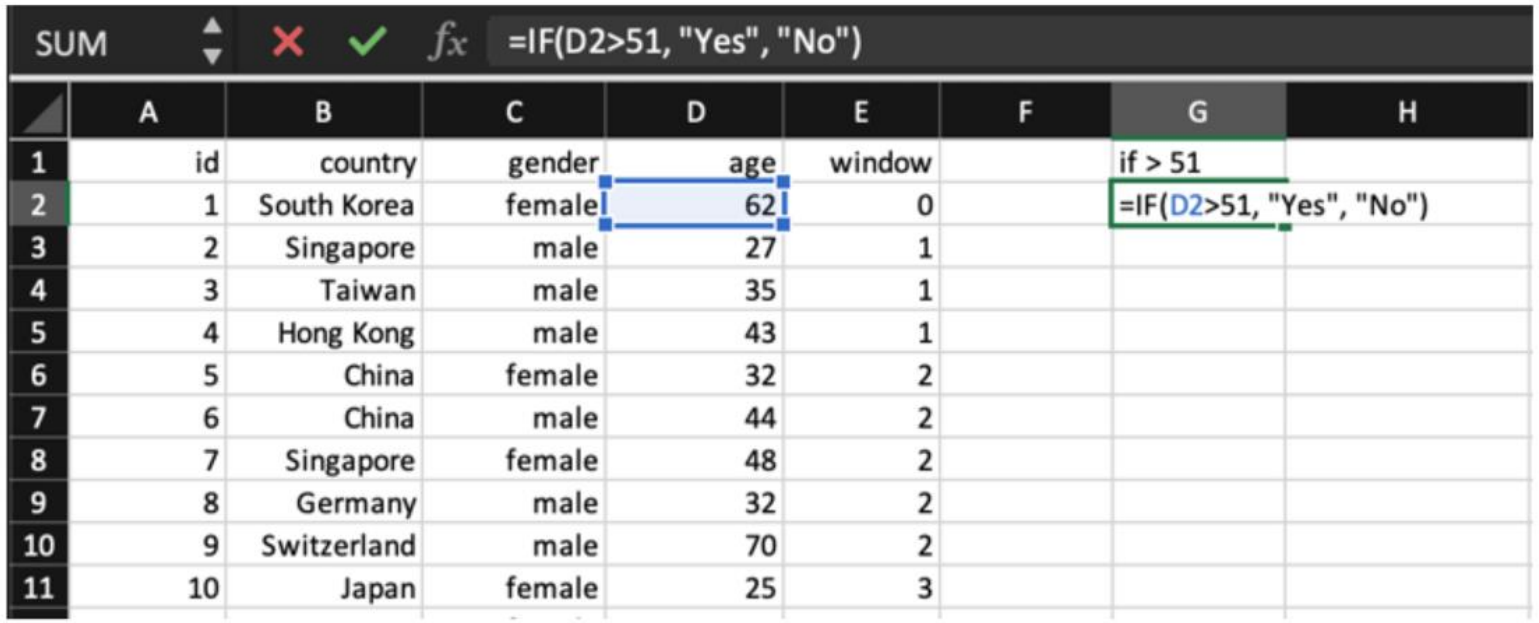
IF

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				

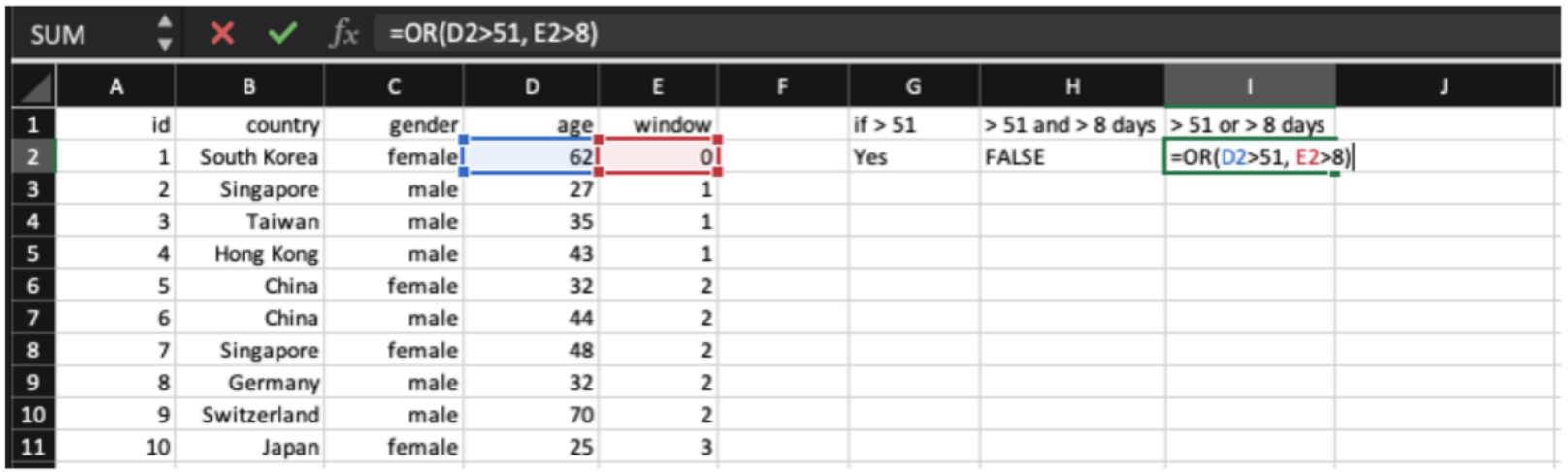
OR

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					

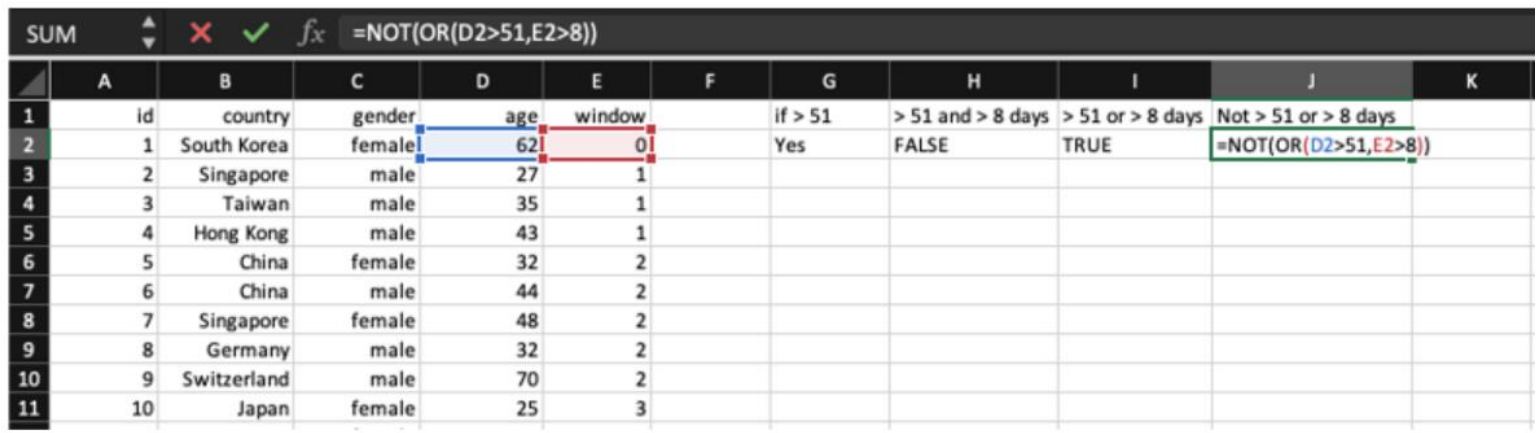
NOT

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						

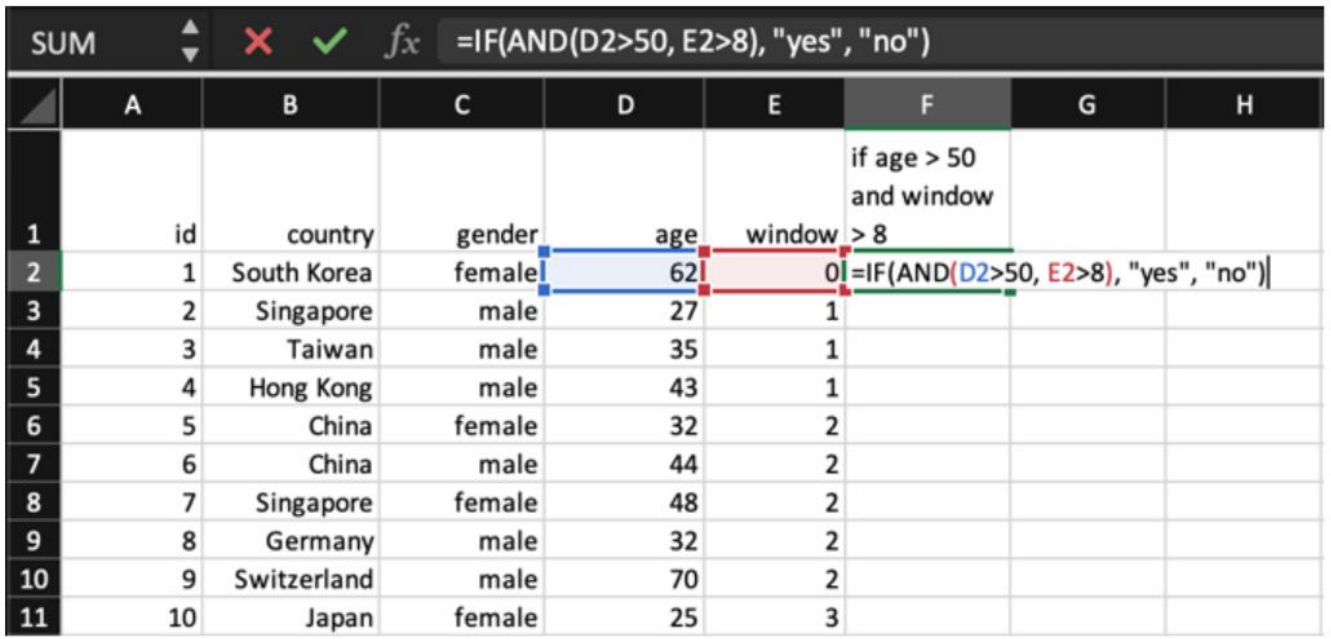
IF/AND

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			

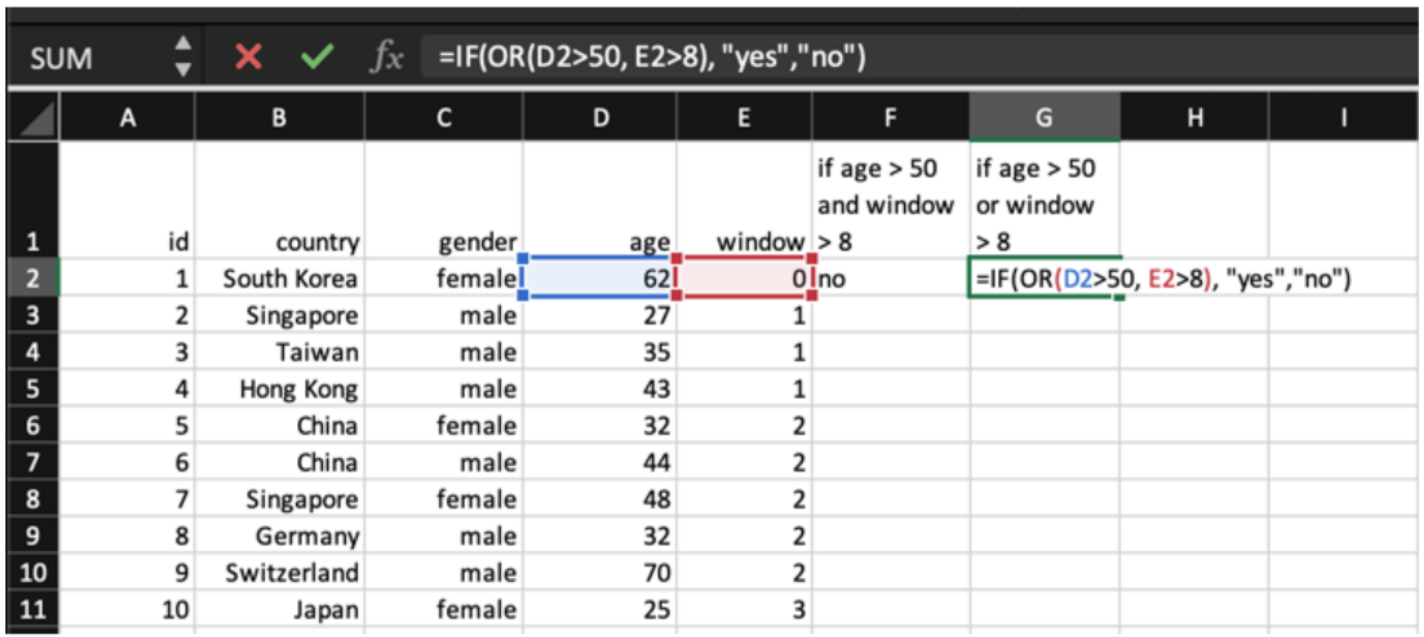
IF/OR

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				

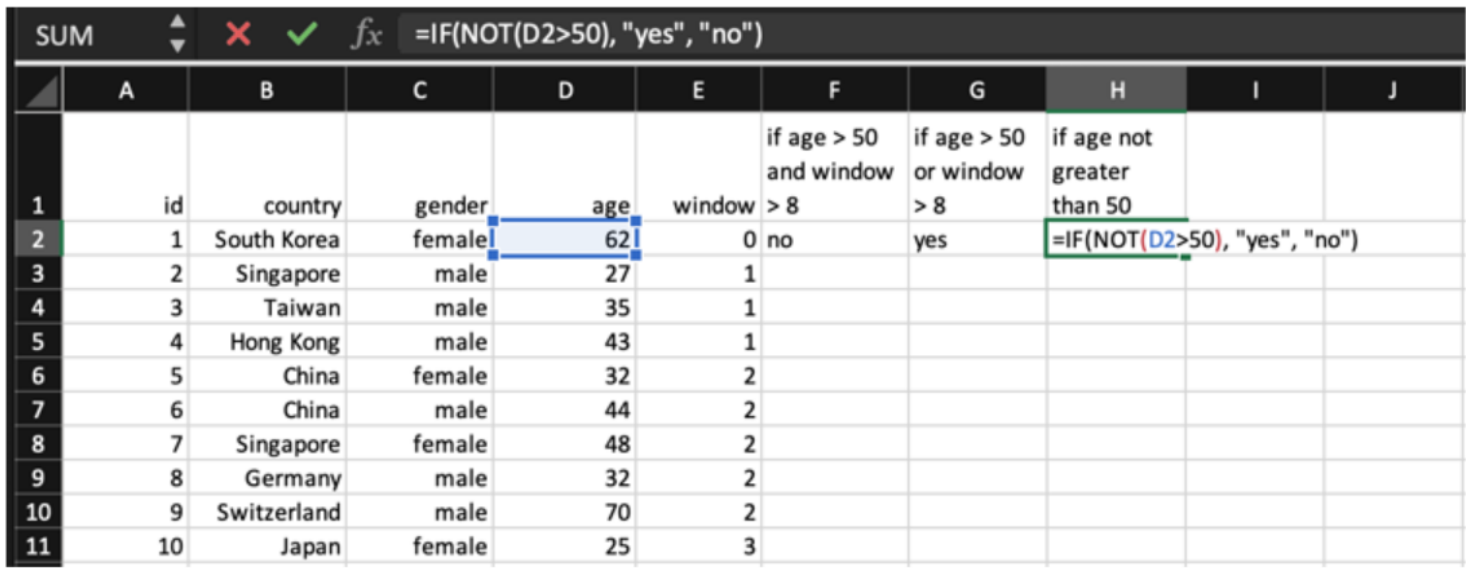
IF/NOT

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”



	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 #5

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:

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.

Annual Salary	Level
$ 50,000	Entry
$ 80,000	Experienced
$ 100,000	Management
$ 280,000	Executive

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

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