Lecture Note #8: Filtering and Sorting Data

BUSI 201: Business Data Analysis

Spring 2023

Topic 1. Tables and Data

Although "Data" and "Tables" often look similar, they play different roles in data analysis. A table is a product of data visualization, which aims to give the reader a glimpse into the properties of the data. For an example, please see Figure 1. Figure 1 contains data on three publicly traded stocks, BRK-B, DIS, and TSLA. The data spans three months from June 1st, 2023 up to Aug. 31st 2023, and has information on daily prices and trade volume of each stock.

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Ticker	Name	Date	Open	High	Low	Close	Volume		Ticker		June		July	ŀ	August	
BRK-B	Berkshire Hathaway Inc.	1-Jun-23	\$321.42	\$323.22	\$319.53	\$323.12	3,375,300		Monthly Ave	erage	Closing P	rice				
DIS	The Walt Disney Company	1-Jun-23	\$ 88.40	\$ 89.06	\$ 87.11	\$ 88.59	11,993,200		BRK-B	\$	335.06	\$	345.14	\$	355.74	
TSLA	Tesla Inc	1-Jun-23	\$202.59	\$209.80	\$199.37	\$207.52	148,029,900		DIS	\$	90.62	\$	87.75	\$	86.27	
BRK-B	Berkshire Hathaway Inc.	2-Jun-23	\$325.16	\$330.67	\$324.42	\$329.48	3,962,200		TSLA	\$	246.09	\$	273.51	\$	242.33	
DIS	The Walt Disney Company	2-Jun-23	\$ 89.63	\$ 91.34	\$ 89.60	\$ 90.77	14,330,500									
TSLA	Tesla Inc	2-Jun-23	\$210.15	\$217.25	\$209.75	\$213.97	164,129,000		Monthly Ave	erage	Trade Vo	ume	(Thousar	nds)		
BRK-B	Berkshire Hathaway Inc.	5-Jun-23	\$330.89	\$330.89	\$327.57	\$328.58	3,091,800		BRK-B		3,730.68		2,784.98		2,802.36	
DIS	The Walt Disney Company	5-Jun-23	\$ 91.20	\$ 91.76	\$ 89.44	\$ 91.00	18,506,700		DIS	1	3,459.93	1	6,013.49	1	6,402.03	
TSLA	Tesla Inc	5-Jun-23	\$217.80	\$221.29	\$214.52	\$217.61	151,143,100		TSLA	16	3,832.28	11	9,604.45	10	8,764.39	
BRK-B	Berkshire Hathaway Inc.	6-Jun-23	\$329.04	\$334.16	\$328.68	\$333.41	3,181,400									
DIS	The Walt Disney Company	6-Jun-23	\$ 91.10	\$ 92.51	\$ 91.02	\$ 92.16	12,109,100									
TSLA	Tesla Inc	6-Jun-23	\$216.14	\$221.91	\$212.53	\$221.31	146,911,600									
BRK-B	Berkshire Hathaway Inc.	7-Jun-23	\$334.01	\$335.82	\$331.43	\$335.42	3,727,800									
DIS	The Walt Disney Company	7-Jun-23	\$ 92.78	\$ 93.08	\$ 91.86	\$ 92.52	11,082,400									
TSLA	Tesla Inc	7-Jun-23	\$228.00	\$230.83	\$223.20	\$224.57	185,710,800									
BRK-B	Berkshire Hathaway Inc.	8-Jun-23	\$335.49	\$336.32	\$334.10	\$335.95	2,759,300									
DIS	The Walt Disney Company	8-Jun-23	\$ 92.52	\$ 92.68	\$ 91.30	\$ 92.53	9,030,200									
TSLA	Tesla Inc	8-Jun-23	\$224.22	\$235.23	\$223.01	\$234.86	164,489,700									
BRK-B	Berkshire Hathaway Inc.	9-Jun-23	\$335.76	\$337.59	\$334.92	\$335.29	2,619,200									
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3,730.68 2,784.98 DIS The Walt Disney Company 5-Jun-23 \$91.20 \$ 91.76 \$ 89.44 \$ 91.00 15,506,700 DIS 13,459.93 16,013.49 1 TSLA Tesla Inc 5-Jun-23 \$212.05 \$ 91.20 \$ 91.46 \$ 93.20 \$ 92.16 12,109,100 TSLA</td><td>Ticker Name Date Open High Low Close Volume BRK-B Berkshire Hathaway Inc. 1-Jun-23 \$321.42 \$323.22 \$319.53 \$323.12 3,375,300 DIS The Walt Disney Company 1-Jun-23 \$88.40 \$89.06 \$87.11 \$88.59 11,993,200 SRK-B Berkshire Hathaway Inc. 1-Jun-23 \$202.59 \$209.80 \$199.37 \$207.52 148,029,900 DIS \$90.62 \$87.75 \$86.27 TSLA Tesla Inc 2-Jun-23 \$210.15 \$217.15 \$217.15 \$217.15 \$217.15 \$217.15 \$217.25 \$209.75 \$143,00,500 BRK-B Berkshire Hathaway Inc. 2-Jun-23 \$210.15 \$217.15 \$210.15 \$217.15 \$210.15 \$217.15 \$210.15 \$217.15 \$210.15 \$217.15 \$210.00 18,506,700 DIS 13,459.93 16,013.49 16,402.03 TSLA Tesla Inc 5-Jun-23 \$21.01 \$21.15 \$212.53 \$221.31 16,911,400 TSLA TSLA Tesla Inc 6-Jun-23 \$21.64 \$221.91</td></td>	Ticker Name Date Open High Low Close Volume BRK-B Berkshire Hathaway Inc. 1-Jun-23 \$321.42 \$323.22 \$319.53 \$323.12 3,375,300 BRt-B BRK-B Close Volume Monthly Average Closing Pr DIS The Walt Disney Company 1-Jun-23 \$220.59 \$209.80 \$199.37 \$207.52 148,029,900 BRK-B \$35.06 SILA Tesla Inc 1-Jun-23 \$220.59 \$209.80 \$199.37 \$207.52 148,029,900 DIS \$9.62 DIS The Walt Disney Company 2-Jun-23 \$210.15 \$217.25 \$209.75 \$143,029,000 DIS \$9.62 DIS Tesla Inc 2-Jun-23 \$210.15 \$217.25 \$209.75 \$143,100 TSLA \$3,30.69 \$30.89 \$327.57 \$328.42 \$90.00 BRK-B \$3,730.68 DIS The Walt Disney Company 5-Jun-23 \$217.61 \$214.52 \$217.61 15,143,100 TSLA TSLA TSLA Tesla Inc 6-Jun-23<	Ticker Name Date Open High Low Close Volume BRK-B Berkshire Hathaway Inc. 1-Jun-23 \$321.42 \$323.22 \$319.53 \$323.12 3,375,300 DIS The Walt Disney Company 1-Jun-23 \$88.40 \$89.06 \$87.11 \$88.59 1,993,200 BRK-B \$87.53.00 DIS The Walt Disney Company 1-Jun-23 \$202.59 \$209.80 \$199.37 \$207.52 148,029,900 DIS \$9.062 \$ DIS The Walt Disney Company 2-Jun-23 \$210.15 \$217.25 \$209.75 2148,029,000 DIS \$ 90.62 \$ DIS The Walt Disney Company 2-Jun-23 \$210.15 \$217.25 \$209.75 \$213.97 164,129,000 BRK-8 \$3,730.68 DIS Tick Parage Trace Volume BRK-B Berkshire Hathaway Inc. 5-Jun-23 \$91.70 \$ 91.76 \$ 89.44 \$ 9100 18,506,700 DIS TSLA Tesla Inc 6-Jun-23 \$211.78 \$221.761 151,	Ticker Name Date Open High Low Close Volume BRK-B Berkshire Hathaway Inc. 1-Jun-23 \$321.42 \$323.22 \$319.53 \$323.12 3,375,300 DIS The Walt Disney Company 1-Jun-23 \$88.40 \$89.06 \$87.11 \$88.59 11,993,200 BRK-B S 335.06 \$345.14 TSLA Tesla Inc 1-Jun-23 \$220.59 \$209.80 \$199.37 \$207.52 148,029,900 DIS \$9.62 \$87.75 BRK-B Berkshire Hathaway Inc. 2-Jun-23 \$210.15 \$217.25 \$209.75 \$218,050 TSLA \$246.09 \$273.51 DIS The Walt Disney Company 5-Jun-23 \$30.89 \$327.57 \$328.58 \$0,91,800 BRK-B \$3,730.68 \$2,784.98 DIS The Walt Disney Company 5-Jun-23 \$91.20 \$91.76 \$89.44 \$91.00 15,506,700 DIS 13,459.93 16,013.49 TSLA Tesla Inc 5-Jun-23 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13,459.93 16,013.49 1 TSLA Tesla Inc 5-Jun-23 \$212.05 \$ 91.20 \$ 91.46 \$ 93.20 \$ 92.16 12,109,100 TSLA	Ticker Name Date Open High Low Close Volume BRK-B Berkshire Hathaway Inc. 1-Jun-23 \$321.42 \$323.22 \$319.53 \$323.12 3,375,300 DIS The Walt Disney Company 1-Jun-23 \$88.40 \$89.06 \$87.11 \$88.59 11,993,200 SRK-B Berkshire Hathaway Inc. 1-Jun-23 \$202.59 \$209.80 \$199.37 \$207.52 148,029,900 DIS \$90.62 \$87.75 \$86.27 TSLA Tesla Inc 2-Jun-23 \$210.15 \$217.15 \$217.15 \$217.15 \$217.15 \$217.15 \$217.25 \$209.75 \$143,00,500 BRK-B Berkshire Hathaway Inc. 2-Jun-23 \$210.15 \$217.15 \$210.15 \$217.15 \$210.15 \$217.15 \$210.15 \$217.15 \$210.15 \$217.15 \$210.00 18,506,700 DIS 13,459.93 16,013.49 16,402.03 TSLA Tesla Inc 5-Jun-23 \$21.01 \$21.15 \$212.53 \$221.31 16,911,400 TSLA TSLA Tesla Inc 6-Jun-23 \$21.64 \$221.91

Figure 1: Data and Tables

The left of Figure 1 is what we call "data." Data can be visualized as "information stacked vertically," where each column contains a different variable. For instance, in the left-hand-side of TABLESvsDATA, we can see that the first column contains information in the ticker, third column containing information on the date of observation, and so on.

Meanwhile, the right hand side of Figure 1 contains information from the data, formatted into a table. Here we use the AVERAGEIFS function to find the relevant information for each cell in the table. Usually, it will be much easier to glean information off from a table compared to the raw data. It would be incredibly difficult to find a clear trend in the average prices or trade volume from the left hand side entry.

Topic 2. Basic Data Analysis: Filtering

We first look into "filters" in Excel as a means to directly analyze data. Suppose that at the moment we are only interested in stock price information for BRK–B. Filtering offers a handy tool in this situation. To apply filters...

- 1. Select the variable names of the data to be filtered. In our example, it should be cells B2: 12.
- 2. On the Quick Access Toolbar, navigate to DATA.
- 3. Click Filter.

File	Home Inse	rt Page Layout Formulas Da	ata Review View Aut	omate Help			_	
Get Data	 Le From Web From Table/ 	Recent Sources	Refresh All ~ Dueries & Connect Properties Edit Links Queries & Connections	tions Stocks	Currencies Data Types	Geography	Ā↓	Filter
S30	~ : ×	f_x						
	A B	С	D	E	F	G	Н	I.
1								
1 2	Ticker	Name	Date	Open	High	Low	Close	Volume
1 2 3		Name Berkshire Hathaway Ir		Open \$321.42		Low \$319.53		Volume 3,375,300
_			nc. 1-Jun-23				\$323.12	
3	BRK-B	Berkshire Hathaway Ir	nc. 1-Jun-23	\$321.42	\$323.22	\$319.53	\$323.12 \$88.59	3,375,300
3 4	BRK-B DIS TSLA	Berkshire Hathaway Ir The Walt Disney Comp	nc. 1-Jun-23 pany 1-Jun-23 1-Jun-23	\$321.42 \$88.40	\$323.22 \$89.06 \$209.80	\$319.53 \$87.11 \$199.37	\$323.12 \$88.59 \$207.52	3,375,300 11,993,200

Figure 2: Applying Filters to Data

As an alternate, you can select the variable names, and then use the hotkey ctrl+shift+L. Once the filters are added, you will see a upside-down triangle mark next to each of the variables in the dataset.

A B	С	D	E	F	G	Н	I
2 Ticke Name		Date	Open 🗸	High 🗸	Low -	Close	Volume 🚽
A ↓ Sort A to Z	thaway Inc.	1-Jun-23	\$321.42	\$323.22	\$319.53	\$323.12	3,375,300
Z ↓ Sort Z to A	ney Company	1-Jun-23	\$ 88.40	\$ 89.06	\$ 87.11	\$ 88.59	11,993,200
Sor <u>t</u> by Color	>	1-Jun-23	\$202.59	\$209.80	\$199.37	\$207.52	148,029,900
Sheet <u>V</u> iew	> ithaway Inc.	2-Jun-23	\$325.16	\$330.67	\$324.42	\$329.48	3,962,200
🔀 Clear Filter From "Ticker"	iney Company	2-Jun-23	\$ 89.63	\$ 91.34	\$ 89.60	\$ 90.77	14,330,500
Filter by Color	>	2-Jun-23	\$210.15	\$217.25	\$209.75	\$213.97	164,129,000
Text <u>F</u> ilters	Ithaway Inc.	5-Jun-23	\$330.89	\$330.89	\$327.57	\$328.58	3,091,800
Search	iney Company	5-Jun-23	\$ 91.20	\$ 91.76	\$ 89.44	\$ 91.00	18,506,700
		5-Jun-23	\$217.80	\$221.29	\$214.52	\$217.61	151,143,100
	athaway Inc.	6-Jun-23	\$329.04	\$334.16	\$328.68	\$333.41	3,181,400
LIN TSLA	ney Company	6-Jun-23	\$ 91.10	\$ 92.51	\$ 91.02	\$ 92.16	12,109,100
		6-Jun-23	\$216.14	\$221.91	\$212.53	\$221.31	146,911,600
	athaway Inc.	7-Jun-23	\$334.01	\$335.82	\$331.43	\$335.42	3,727,800
	ney Company	7-Jun-23	\$ 92.78	\$ 93.08	\$ 91.86	\$ 92.52	11,082,400
OK Cance	1	7-Jun-23	\$228.00	\$230.83	\$223.20	\$224.57	185,710,800
IO DKK-D DERKSNIFE	nathaway Inc.	8-Jun-23	\$335.49	\$336.32	\$334.10	\$335.95	2,759,300

Figure 3: Filtering by Ticker Symbol

Clicking the upside-down triangle mark in the red box in Figure 3, you will see that currently all three types of tickers have a check mark next to it in the blue of in Figure 3. This blue box serves two main purposes for us at this point:

- 1. It shows us the list of all entries under the Ticker variable in the data, and
- 2. It shows us which ones are currently "filtered/unfiltered."

Click on the items DIS and TSLA in the blue box in Figure 4 so that a check mark only appears next to BRK-B, and that next to (Select All) is now a black square as shown in Figure 4, and click Ok in the green box.

A B	С	D	E	F	G	Н	I
2 Ticke Name		Date	Open 🗸	High 🖵	Low 🗸	Close	Volume 🕞
A ↓ Sort A to Z	thaway Inc.	1-Jun-23	\$321.42	\$323.22	\$319.53	\$323.12	3,375,300
Z ↓ Sort Z to A	ney Company	1-Jun-23	\$ 88.40	\$ 89.06	\$ 87.11	\$ 88.59	11,993,200
Sor <u>t</u> by Color	>	1-Jun-23	\$202.59	\$209.80	\$199.37	\$207.52	148,029,900
Sheet <u>V</u> iew	> thaway Inc.	2-Jun-23	\$325.16	\$330.67	\$324.42	\$329.48	3,962,200
🔀 Clear Filter From "Ticker"	ney Company	2-Jun-23	\$ 89.63	\$ 91.34	\$ 89.60	\$ 90.77	14,330,500
Filter by Color	>	2-Jun-23	\$210.15	\$217.25	\$209.75	\$213.97	164,129,000
Text <u>F</u> ilters	> thaway Inc.	5-Jun-23	\$330.89	\$330.89	\$327.57	\$328.58	3,091,800
Search	ney Company	5-Jun-23	\$ 91.20	\$ 91.76	\$ 89.44	\$ 91.00	18,506,700
		5-Jun-23	\$217.80	\$221.29	\$214.52	\$217.61	151,143,100
- DIS	athaway Inc.	6-Jun-23	\$329.04	\$334.16	\$328.68	\$333.41	3,181,400
	sney Company	6-Jun-23	\$ 91.10	\$ 92.51	\$ 91.02	\$ 92.16	12,109,100
		6-Jun-23	\$216.14	\$221.91	\$212.53	\$221.31	146,911,600
	athaway Inc.	7-Jun-23	\$334.01	\$335.82	\$331.43	\$335.42	3,727,800
	ney Company	7-Jun-23	\$ 92.78	\$ 93.08	\$ 91.86	\$ 92.52	11,082,400
OK Car	ncel	7-Jun-23	\$228.00	\$230.83	\$223.20	\$224.57	185,710,800
IO DKK-D DELKSTII	е п аthaway Inc.	8-Jun-23	\$335.49	\$336.32	\$334.10	\$335.95	2,759,300

Figure 4: Filtering by Ticker Symbol (cont'd)

Once the filter is applied, the data will resemble Figure 5. The first thing we can notice is that now we only see the data from BRK-B, and the others are "hidden away." Second, notice that the upside-down triangle next to Ticker is now slightly difference (in the red box), which tells us that a filter is active on Ticker. Finally, the row number indicator to the left hand side (in the blue box) is now blue, and has missing numbers, which also indicates that filters are active on this worksheet.

	Α	В	С	D	E	F	G	Н	I
1									
2		Ticke 🕁	Name	Jate	• Open 🕞	High 🖵	Low	Close 🗸	Volume 🚽
3		BRK-B	Berkshire Hathaway Inc.	1-Jun-23	\$321.42	\$323.22	\$319.53	\$323.12	3,375,300
2 3 6 9		BRK-B	Berkshire Hathaway Inc.	2-Jun-23	\$325.16	\$330.67	\$324.42	\$329.48	3,962,200
9		BRK-B	Berkshire Hathaway Inc.	5-Jun-23	\$330.89	\$330.89	\$327.57	\$328.58	3,091,800

Figure 5: Filtered by Ticker Symbol

Filtering by Dates

In addition to filtering data out by exact text entries, we can sort data by dates as well. Suppose that we want to filter information so that we only see stock trading information for the month of August 2023.

	A B		С	D	E	F	G	Н	I	J
1										
2	Ticke-	Name		🚽 Date 🛛 🔽	Open 🚽		- Low	Close	Volume	
3	BRK-B		^A Z↓ Sort Oldest to Newes		\$321.42	\$323.22		\$323.12	3,375,300	
4	DIS	The Walt Dis	Z ↓ Sort Newest to Oldes	t	\$ 88.40	\$ 89.06	5 \$ 87.11	\$ 88.59	11,993,200	
5	TSLA	Tesla Inc	Sor <u>t</u> by Color	>	<u>E</u> quals	0	\$199.37	\$207.52	148,029,900	
6	BRK-B	Berkshire Ha	Sheet <u>V</u> iew	>	<u>B</u> efore	7	\$324.42	\$329.48	3,962,200	
7	DIS	The Walt Dis	🔀 Clear Filter From "Da	te"	<u>A</u> fter	4	\$ 89.60	\$ 90.77	14,330,500	
8	TSLA	Tesla Inc	Filter by Color	>	Bet <u>w</u> een	5	\$209.75	\$213.97	164,129,000	
9	BRK-B	Berkshire Ha	Date <u>F</u> ilters	>	Tomorrow	9	\$327.57	\$328.58	3,091,800	
10	DIS	The Walt Dis	Search (All)	•	T <u>o</u> day	e	5 \$ 89.44	\$ 91.00	18,506,700	
11	TSLA	Tesla Inc	(Select All)		Yester <u>d</u> ay	9	\$214.52	\$217.61	151,143,100	
12	BRK-B	Berkshire Ha			Next Wee <u>k</u>	e	\$328.68	\$333.41	3,181,400	
13	DIS	The Walt Dis	i Iuly I July		T <u>h</u> is Week	1	\$ 91.02	\$ 92.16	12,109,100	
14	TSLA	Tesla Inc			Last Week	1	\$212.53	\$221.31	146,911,600	
15	BRK-B	Berkshire Ha			Next <u>M</u> onth	2	\$331.43	\$335.42	3,727,800	
16	DIS	The Walt Dis			Thi <u>s</u> Month	8	\$ \$ 91.86	\$ 92.52	11,082,400	
17	TSLA	Tesla Inc		OK Cancel	Last Mo <u>n</u> th	3	\$ \$223.20	\$224.57	185,710,800	
18	BRK-B	Berkshire Ha	thaway mc.	o-jun-25	Next <u>Q</u> uarte	er 2	\$334.10	\$335.95	2,759,300	
19	DIS	The Walt Dis	ney Company	8-Jun-23	This Q <u>u</u> arter	2	\$ \$ 91.30	\$ 92.53	9,030,200	
20	TSLA	Tesla Inc		8-Jun-23	Last Qua <u>r</u> ter	'3	\$ \$223.01	\$234.86	164,489,700	
21	BRK-B	Berkshire Ha	thaway Inc.	9-Jun-23	Ne <u>x</u> t Year	9	\$334.92	\$335.29	2,619,200	
22	DIS	The Walt Dis	ney Company	9-Jun-23	Th <u>i</u> s Year	2	\$ 91.55	\$ 91.93	9,625,400	
23	TSLA	Tesla Inc		9-Jun-23	Last <u>Y</u> ear	2	\$242.02	\$244.40	199,882,300	
24	BRK-B	Berkshire Ha	thaway Inc.	12-Jun-23	Year to D <u>a</u> te	. 5	\$332.22	\$333.60	2,873,400	
<	> TAE	LESvsDATA FILT	ER CONDITIONAL1	+	All Dates in	the <u>P</u> eriod > -				
Ready	🛠 Accessibility: I				Custom <u>F</u> ilt	er				

Figure 6: Filtering by Date

Click on the upside-down triangle to the right of Date in the red box in Figure 5. Then we can head to the region in the green box, and deselect the months of June and July. Alternatively, we can see more options by heading to Date Filters in the blue box. Clicking on Date Filters will lead to Excel showing more advanced options to sort by date as shown in the purple box in Figure 5.

	Α	В	С	D	E	F	G	Н	
1									
2		Ticke -	Name	🖵 Date 🔉	Open 🗸	High 🚽	Low	Close 🗸	Volume 🗸
126		BRK-B	Berkshire Hathaway Inc.	1-Aug-23	\$352.03	\$353.42	\$351.25	\$352.26	2,293,300
127		DIS	The Walt Disney Company	1-Aug-23	\$ 89.12	\$ 89.73	\$ 88.46	\$ 89.03	13,717,500
128		TSLA	Tesla Inc	1-Aug-23	\$266.26	\$266.47	\$260.25	\$261.07	83,166,000
129		BRK-B	Berkshire Hathaway Inc.	2-Aug-23	\$351.45	\$352.89	\$349.69	\$351.19	3,085,900
130		DIS	The Walt Disney Company	2-Aug-23	\$ 88.26	\$ 88.33	\$ 86.26	\$ 86.30	15,162,700
131		TSLA	Tesla Inc	2-Aug-23	\$255.57	\$259.52	\$250.49	\$254.11	101,752,900

Figure 7: Filtered by Date

Filtering by Numbers

As we were able to filter the data by numbers, it is also possible to filter data by numbers. Suppose for instance, that wer are trying to only view data for stock prices only when the trade volume is above 100,000,000 shares. This time, click on the upside-down triangle next to Volume(red box in Figure 8).

	A B	С	D	E	F	G H	I.
1							
2	Ticker	Name	Date	Open	High 🛛	Low Close	🖥 Volume 📑
3	BRK-B	Berkshire Hathaway Inc.	1-Jun-23	\$321.42	\$323.22	\$319.53 \$323.	
4	DIS	The Walt Disney Company	1-Jun-23	\$ 88.40	\$ 89.06	\$ 87.11 \$ 88.	Sort by Color >
5	TSLA	Tesla Inc	1-Jun-23	\$202.59	\$209.80	\$199.37 \$207.	Sheet grew 2
6	BRK-B	Berkshire Hathaway Inc.	2-Jun-23	\$325.16	\$330.67	\$32 <u>1 17 \$270</u>	Fjiter by Color > Number Eilters >
7	DIS	The Walt Disney Company	2-Jun-23	\$ 89.63	\$ 91.34	\$ 8 Does Not Equal	Search
8	TSLA	Tesla Inc	2-Jun-23	\$210.15	\$217.25	\$20 Greater Than Greater Than <u>O</u> r Equal To	- 2 1,728,000 - 2 1,990,700
9	BRK-B	Berkshire Hathaway Inc.	5-Jun-23	\$330.89	\$330.89	\$32 Less Than Less Than Or Egual To	- 2 2,047,400 - 2 2,136,800 - 2 2,196,100
10	DIS	The Walt Disney Company	5-Jun-23	\$ 91.20	\$ 91.76	\$ 8 Between	- 2,239,500 - 2,285,600 - 2,293,300
11	TSLA	Tesla Inc	5-Jun-23	\$217.80	\$221.29	\$21 Above Average	OK Cancel
12	BRK-B	Berkshire Hathaway Inc.	6-Jun-23	\$329.04	\$334.16	\$32 Below Average Custom Eilter	41 3,181,400
13	DIS	The Walt Disney Company	6-Jun-23	\$ 91.10	\$ 92.51	\$ 91.02 \$ 92.	16 12,109,100

Figure 8: Filtering by Numbers

Similar to the previous case when applying filters to data, we can head to the region in the green box and select every entry that is greater than 100,000,000 manually. However, this is a rather tedious process and is prone to mistakes. So we should head to Number Filters in the blue box. Clicking on Number Filters and Greater than or Equal to leads to a new window pop-up as seen in Figure 9.

Custom Autofilter	?	×
Show rows where: Volume		
is greater than or equal 🗸 100,000,00	00	~
O And ○ Or		
×		¥
Use ? to represent any single character		
Use * to represent any series of characters		
	ОК	Cancel

Figure 9: Greater than or Equal to

Inserting 100,000,000 and clicking OK will lead to the data being filtered so that only the entries with greater than 100,000,000 shares being traded appear on the worksheet. Note that what we are doing here is not "filtering the stock that had more than 100,000,000 shared being traded at any time." You will notice that while TSLA is the only stock in the current data that has days where more than 100,000,000 shares were traded in the market, there are some days missing from the sorted result.

Using Wildcards in Filters

Recall Wildcards that we covered in a previous lecture note. Sometimes, we may want to create a filter that only displays items that contain a certain word or a certain sequence of numbers. We can use wildcard characters to achieve this goal.

Wildcard	Function
*	Replaces an arbitrary number of characters in the search. (i.e. North* will return North Carolina and North Dakota)
?	Replaces one character in the search. (i.e. N? returns NE, NV, NH, NJ, NM, NY, NC, ND)
~	Used to override other wildcards. (i.e. N~* returns N*)

An example of using wildcard characters in filters can be found in Figure 10. Using the term *Inc*, we are able to find any entries under Name that has the term Inc in the official company name listed in the NYSE.

	A B	С	D	E	F	G	Н	l J
1								
2	Ticke	Name	Date	- Open -	High 🕞	Low	Close 🗸	Volume 🕞
3	BRK-	^A _Z ↓ Sort A to Z	1-Jun-23	\$321.42	\$323.22	\$319.53	\$323.12	3,375,300
4	DIS	Z↓ Sort Z to A	1-Jun-23	\$ 88.40	\$ 89.06	\$ 87.11	\$ 88.59	11,993,200
5	TSLA	Sor <u>t</u> by Color >	1-Jun-23	\$202.59	\$209.80	\$199.37	\$207.52	148,029,900
6	BRK-	Sheet View >	2-Jun-23	\$325.16	\$330.67	\$324.42	\$329.48	3,962,200
7	DIS	Clear Filter From "Name"	2-Jun-23	\$ 89.63	\$ 91.34	\$ 89.60	\$ 90.77	14,330,500
8	TSLA	Filter by Color	2-Jun-23	\$210.15	\$217.25	\$209.75	\$213.97	164,129,000
9	BRK-	Text Filters	5-Jun-23	\$330.89	\$330.89	\$327.57	\$328.58	3,091,800
10	DIS	_	5-Jun-23	\$ 91.20	\$ 91.76	\$ 89.44	\$ 91.00	18,506,700
11	TSLA	*Inc* ×	5-Jun-23	\$217.80	\$221.29	\$214.52	\$217.61	151,143,100
12	BRK-		6-Jun-23	\$329.04	\$334.16	\$328.68	\$333.41	3,181,400
13	DIS	Berkshire Hathaway Inc. Tesla Inc	6-Jun-23	\$ 91.10	\$ 92.51	\$ 91.02	\$ 92.16	12,109,100
14	TSLA		6-Jun-23	\$216.14	\$221.91	\$212.53	\$221.31	146,911,600
15	BRK-		7-Jun-23	\$334.01	\$335.82	\$331.43	\$335.42	3,727,800
16	DIS		7-Jun-23	\$ 92.78	\$ 93.08	\$ 91.86	\$ 92.52	11,082,400
17	TSLA		7-Jun-23	\$228.00	\$230.83	\$223.20	\$224.57	185,710,800
18	BRK-	OK Cancel	8-Jun-23	\$335.49	\$336.32	\$334.10	\$335.95	2,759,300
19	DIS	The wait Disney company	8-Jun-23	\$ 92.52	\$ 92.68	\$ 91.30	\$ 92.53	9,030,200

Figure 10: Wildcards in Filters

Topic 3. Basic Data Analysis: Sorting using Filters

Please navigate to worksheet FILTER in the workbook. This sheet contains a larger dataset that is similar to the previous one in the TABLESvsDATA sheet. Here we have 8 different assets' price information for the month of August 2023. We now look into filters as a tool in Excel as a means to sort data, which will allow us to directly analyze data. As it stands, the data is filtered in the following order:

- 1. Date (Earlier date first)
- 2. Ticker (Alphabetical)
- 3. Type of Asset (Alphabetical)

To see how filters can work to sort data, select the cells that contain variable names (B2: J2), and apply filters. Suppose that we want sort the data so that we have the data sorted by Ticker alphabetically so that all entries of BRK-B appear before any entry of DAL, which comes before any entry of DIS, and so forth...

A B	С	D	E	F	G	Н	I	J
2 Ticke Name	~	Туре	Date 🗊	Open 🗸	High 🕞	Low	Close 🗸	Volume 🗸
2↓ Sort A to Z	thaway Inc.	Stock	1-Aug-23	\$352.03	\$353.42	\$351.25	\$352.26	2,293,300
Z↓ Sort Z to A	es, Inc.	Stock	1-Aug-23	\$ 45.74	\$ 45.75	\$ 44.26	\$ 45.40	9,002,800
Sor <u>t</u> by Color	ney Company	Stock	1-Aug-23	\$ 89.12	\$ 89.73	\$ 88.46	\$ 89.03	13,717,500
Sheet View	hares	ETF	1-Aug-23	\$180.85	\$181.38	\$180.19	\$180.46	6,239,700
Clear Filter From "Ticker"	lorp.	Stock	1-Aug-23	\$ 21.95	\$ 22.00	\$ 21.26	\$ 21.50	2,567,100
Filter by Color	ales Subversive F	RETF	1-Aug-23	\$ 26.31	\$ 26.38	\$ 26.31	\$ 26.34	1,400
Text <u>F</u> ilters	•	Stock	1-Aug-23	\$266.26	\$266.47	\$260.25	\$261.07	83,166,000
Search	00 Index Fund	ETF	1-Aug-23	\$419.26	\$420.08	\$418.55	\$419.38	3,118,000
	ithaway Inc.	Stock	2-Aug-23	\$351.45	\$352.89	\$349.69	\$351.19	3,085,900
DAL	es, Inc.	Stock	2-Aug-23	\$ 44.91	\$ 45.08	\$ 44.63	\$ 44.80	7,641,900
✓ DIS ✓ GLD	ney Company	Stock	2-Aug-23	\$ 88.26	\$ 88.33	\$ 86.26	\$ 86.30	15,162,700
✓ GME ✓ KRUZ	hares	ETF	2-Aug-23	\$180.57	\$180.79	\$179.41	\$179.60	6,339,700
TSLA	Corp.	Stock	2-Aug-23	\$ 21.15	\$ 21.15	\$ 20.34	\$ 20.83	2,625,800
	ales Subversive F	RETF	2-Aug-23	\$ 26.21	\$ 26.21	\$ 25.91	\$ 25.96	1,100
OK Cancel)	Stock	2-Aug-23	\$255.57	\$259.52	\$250.49	\$254.11	101,752,900
voo vanguaru s	00 Index Fund	ETF	2-Aug-23	\$416.46	\$416.70	\$412.88	\$413.57	4,973,700

Figure 11: Sorting by Ticker Symbol

To acheive this task, click on the upside-down triangle in the red box in Figure 11, and select Sort A to Z to sort alphabetically.¹ However, we may want to sort the data by multiple variables...

¹Choosing Sort Z to A will result in the opposite result.

Sorting by Multiple Variables

Now suppose that we want to sort the data in the following order:

- 1. Ticker (Alphabetical)
- 2. Date (Earlier date first)

That is, we want to sort by Ticker alphabetically as we did in the previous example, but within the alphabetically sorted Ticker, have the most recent trade information on top. To get this result, we must first sort by Date, and then sort by Ticker.

	A B	С	D	E	F	G	Н		J
1									
2	Ticke	Name	🗸 Туре 💽	Date	🛛 Open 🚽	High 🚽	Low	Close	Volume 🚽
3	BRK-B	Berkshire Hathaway I	Sort Oldest to Newest	-	\$352.03	\$353.42	\$351.25	\$352.26	2,293,300
4	DAL	Delta Air Lines, Inc.	Z↓ Sort Newest to Oldest	:	\$ 45.74	\$ 45.75	\$ 44.26	\$ 45.40	9,002,800
5	DIS	The Walt Disney Com	Sor <u>t</u> by Color		\$ 89.12	\$ 89.73	\$ 88.46	\$ 89.03	13,717,500
6	GLD	SPDR Gold Shares	Sheet <u>V</u> iew		\$180.85	\$181.38	\$180.19	\$180.46	6,239,700
7	GME	GameStop Corp.	😪 Clear Filter From "Dat	e"	\$ 21.95	\$ 22.00	\$ 21.26	\$ 21.50	2,567,100
8	KRUZ	Unusual Whales Subv	Filter by Color		\$ 26.31	\$ 26.38	\$ 26.31	\$ 26.34	1,400
9	TSLA	Tesla Inc	Date <u>F</u> ilters		\$266.26	\$266.47	\$260.25	\$261.07	83,166,000
10	VOO	Vanguard 500 Index I	Search (All)	-	\$419.26	\$420.08	\$418.55	\$419.38	3,118,000
11	BRK-B	Berkshire Hathaway I	2023		\$351.45	\$352.89	\$349.69	\$351.19	3,085,900
12	DAL	Delta Air Lines, Inc.	August		\$ 44.91	\$ 45.08	\$ 44.63	\$ 44.80	7,641,900
13	DIS	The Walt Disney Com	······································	1	\$ 88.26	\$ 88.33	\$ 86.26	\$ 86.30	15,162,700
14	GLD	SPDR Gold Shares			\$180.57	\$180.79	\$179.41	\$179.60	6,339,700
15	GME	GameStop Corp.	- 🗹 08		\$ 21.15	\$ 21.15	\$ 20.34	\$ 20.83	2,625,800
16	KRUZ	Unusual Whales Subv			\$ 26.21	\$ 26.21	\$ 25.91	\$ 25.96	1,100
17	TSLA	Tesla Inc		OK Cancel	\$255.57	\$259.52	\$250.49	\$254.11	101,752,900
18	VOO	Vanguard 500 Index I		z-Aug-zo	\$416.46	\$416.70	\$412.88	\$413.57	4,973,700

Figure 12: Sorting by Ticker-Date: Date

	В	С	D	E	F	G	Н	1	J
1	h. Niewe			- Dete	0		1		
	ke 🔽 Name	1				•			Volume 🚽
^A ∠↓ Sort A to Z		athaway Inc.	Stock	31-Aug-23	\$362.18	\$362.47	\$359.25	\$360.20	2,842,300
Z↓ S <u>o</u> rt Z to A		es, Inc.	Stock	31-Aug-23	\$ 43.54	\$ 43.58	\$ 42.43	\$ 42.88	6,506,500
Sor <u>t</u> by Color	>	ney Company	Stock	31-Aug-23	\$ 84.46	\$ 84.61	\$ 83.64	\$ 83.68	10,448,000
Sheet <u>V</u> iew	>	hares	ETF	31-Aug-23	\$180.37	\$180.49	\$179.94	\$180.02	4,795,600
🔀 Clear Filter Fro	m "Ticker"	Corp.	Stock	31-Aug-23	\$ 18.41	\$ 19.42	\$ 18.15	\$ 18.55	4,674,100
Filter by Color	>	ales Subversive I	R ETF	31-Aug-23	\$ 25.70	\$ 25.70	\$ 25.70	\$ 25.70	400
Text <u>F</u> ilters	>		Stock	31-Aug-23	\$255.98	\$261.18	\$255.05	\$258.08	108,861,700
Search		00 Index Fund	ETF	31-Aug-23	\$414.98	\$416.12	\$413.66	\$413.83	4,751,100
Select A	II)	ithaway Inc.	Stock	30-Aug-23	\$358.63	\$362.68	\$358.60	\$361.06	3,058,300
DAL		es, Inc.	Stock	30-Aug-23	\$ 43.78	\$ 43.85	\$ 43.22	\$ 43.23	5,511,900
IS IS 		sney Company	Stock	30-Aug-23	\$ 84.40	\$ 84.68	\$ 83.83	\$ 84.28	11,816,600
		hares	ETF	30-Aug-23	\$180.58	\$180.88	\$180.29	\$180.32	6,593,700
TSLA		Corp.	Stock	30-Aug-23	\$ 18.20	\$ 18.52	\$ 17.91	\$ 18.37	1,884,500
		ales Subversive	RETF	30-Aug-23	\$ 25.60	\$ 25.74	\$ 25.60	\$ 25.71	4,000
	OK Cancel		Stock	30-Aug-23	\$254.20	\$260.51	\$250.59	\$256.90	121,988,400
10 00	o vanguaro :	00 Index Fund	ETF	30-Aug-23	\$413.03	\$415.03	\$412.40	\$414.36	3,004,500

Figure 13: Sorting by Ticker-Date: Ticker

The results of the sorting from Figures 12 and 13 is displayed in Figure 14 below. You can see that all entries of BRK-B comes first, with each entry of BRK-B being sorted from newest to oldest information. Scroll down a bit, and you will see that the next entries will be DAL sorted from newest to oldest stock market data.

	А	В	С	D	E	F	G	Н	1	J
1										
2		Ticke 🗊	Name	🗸 Туре	🚽 Date 🚽	Open 🗸	High 🚽	Low 🗸	Close -	Volume 🗸
3		BRK-B	Berkshire Hathaway Inc.	Stock	31-Aug-23	\$362.18	\$362.47	\$359.25	\$360.20	2,842,300
4		BRK-B	Berkshire Hathaway Inc.	Stock	30-Aug-23	\$358.63	\$362.68	\$358.60	\$361.06	3,058,300
5		BRK-B	Berkshire Hathaway Inc.	Stock	29-Aug-23	\$355.04	\$358.59	\$354.01	\$358.29	2,285,600
6		BRK-B	Berkshire Hathaway Inc.	Stock	28-Aug-23	\$357.89	\$358.41	\$354.53	\$355.55	1,728,000
7		BRK-B	Berkshire Hathaway Inc.	Stock	25-Aug-23	\$354.99	\$357.35	\$352.92	\$355.93	2,136,800
8		BRK-B	Berkshire Hathaway Inc.	Stock	24-Aug-23	\$354.35	\$357.23	\$354.13	\$354.30	2,521,100
9		BRK-B	Berkshire Hathaway Inc.	Stock	23-Aug-23	\$351.63	\$354.32	\$351.54	\$354.26	2,239,500
10		BRK-B	Berkshire Hathaway Inc.	Stock	22-Aug-23	\$353.01	\$353.50	\$349.66	\$350.57	2,363,300

Figure 14: Sorted by Ticker-Date

Order of Sorting

Reversing the order of sorting, that is by sorting on Ticker first, and then Date, we find the following incorrect result in Figure 15. We can see that while the Ticker is indeed alphabetically sorted, the sorting in the Date variable is of a higher "priority," as it was sorted last.

	А	В	С	D	E	F	G	Н	I	J
1										
2		Ticke 🕁	Name	Туре 🚽	Date 🚽	Open 🚽	High 🗖	Low 🗸	Close	Volume 🗖
3		BRK-B	Berkshire Hathaway Inc.	Stock	31-Aug-23	\$362.18	\$362.47	\$359.25	\$360.20	2,842,300
4		DAL	Delta Air Lines, Inc.	Stock	31-Aug-23	\$ 43.54	\$ 43.58	\$ 42.43	\$ 42.88	6,506,500
5		DIS	The Walt Disney Company	Stock	31-Aug-23	\$ 84.46	\$ 84.61	\$ 83.64	\$ 83.68	10,448,000
6		GLD	SPDR Gold Shares	ETF	31-Aug-23	\$180.37	\$180.49	\$179.94	\$180.02	4,795,600
7		GME	GameStop Corp.	Stock	31-Aug-23	\$ 18.41	\$ 19.42	\$ 18.15	\$ 18.55	4,674,100
8		KRUZ	Unusual Whales Subversive	ETF	31-Aug-23	\$ 25.70	\$ 25.70	\$ 25.70	\$ 25.70	400
9		TSLA	Tesla Inc	Stock	31-Aug-23	\$255.98	\$261.18	\$255.05	\$258.08	108,861,700
10		VOO	Vanguard 500 Index Fund	ETF	31-Aug-23	\$414.98	\$416.12	\$413.66	\$413.83	4,751,100
11		BRK-B	Berkshire Hathaway Inc.	Stock	30-Aug-23	\$358.63	\$362.68	\$358.60	\$361.06	3,058,300
12		DAL	Delta Air Lines, Inc.	Stock	30-Aug-23	\$ 43.78	\$ 43.85	\$ 43.22	\$ 43.23	5,511,900
13		DIS	The Walt Disney Company	Stock	30-Aug-23	\$ 84.40	\$ 84.68	\$ 83.83	\$ 84.28	11,816,600
14		GLD	SPDR Gold Shares	ETF	30-Aug-23	\$180.58	\$180.88	\$180.29	\$180.32	6,593,700
15		GME	GameStop Corp.	Stock	30-Aug-23	\$ 18.20	\$ 18.52	\$ 17.91	\$ 18.37	1,884,500
16		KRUZ	Unusual Whales Subversive	ETF	30-Aug-23	\$ 25.60	\$ 25.74	\$ 25.60	\$ 25.71	4,000
17		TSLA	Tesla Inc	Stock	30-Aug-23	\$254.20	\$260.51	\$250.59	\$256.90	121,988,400
18		VOO	Vanguard 500 Index Fund	ETF	30-Aug-23	\$413.03	\$415.03	\$412.40	\$414.36	3,004,500

Figure 15: Sorted by Date-Ticker (Incorrect)

Thus, if you want the data should be sorted by variables A first, B second, and then C in that order, you must apply the sorting via filters in the opposite order of C > B > A.

Range of Sorting

Selecting the correct range to apply filters is critical when it comes to using the filters to sort data. Return to worksheet FILTER and remove the filter from cells B2: J2 by selecting this region, and clicking Data > Filter. Now apply the filter for cells B2: I2, leaving Volume out when we are setting filters as shown in Figure 16.

	Α	В	С	D	E	F	G	Н	I.	J
1										_
2		Ticke	Name	Туре	🗖 Date	Open 🚽	High 🗖	Low 🗸	Close	Volume
3		BRK-B	Berkshire Hathaway Inc.	Stock	1-Aug-23	\$352.03	\$353.42	\$351.25	\$352.26	2,293,300
4		DAL	Delta Air Lines, Inc.	Stock	1-Aug-23	\$ 45.74	\$ 45.75	\$ 44.26	\$ 45.40	9,002,800
5		DIS	The Walt Disney Company	Stock	1-Aug-23	\$ 89.12	\$ 89.73	\$ 88.46	\$ 89.03	13,717,500
6		GLD	SPDR Gold Shares	ETF	1-Aug-23	\$180.85	\$181.38	\$180.19	\$180.46	6,239,700
7		GME	GameStop Corp.	Stock	1-Aug-23	\$ 21.95	\$ 22.00	\$ 21.26	\$ 21.50	2,567,100
8		KRUZ	Unusual Whales Subversive	e ETF	1-Aug-23	\$ 26.31	\$ 26.38	\$ 26.31	\$ 26.34	1,400
9		TSLA	Tesla Inc	Stock	1-Aug-23	\$266.26	\$266.47	\$260.25	\$261.07	83,166,000

Figure 16: Incorrect Filter Applied

If we sort this data using the filters, we will see that the variable Volume is left out when sorting the data. Notice that the Volume data did not change when we sorted Ticker alphabetically.

	Α	В	С	D	E	F	G	Н	I.	J
1										
2		Ticke	Name	🗖 Туре	Date	Open	High	Low	Close 🖉	Volume
3		BRK-B	Berkshire Hathaway Inc.	Stock	1-Aug-23	\$352.03	\$353.42	\$351.25	\$352.26	2,293,300
4		BRK-B	Berkshire Hathaway Inc.	Stock	2-Aug-23	\$351.45	\$352.89	\$349.69	\$351.19	9,002,800
5		BRK-B	Berkshire Hathaway Inc.	Stock	3-Aug-23	\$350.29	\$354.47	\$349.42	\$353.81	13,717,500
6		BRK-B	Berkshire Hathaway Inc.	Stock	4-Aug-23	\$ 353.99	\$355.11	\$349.39	\$349.99	6,239,700
7		BRK-B	Berkshire Hathaway Inc.	Stock	7-Aug-23	\$355.73	\$364.63	\$355.15	\$362.58	2,567,100
8		BRK-B	Berkshire Hathaway Inc.	Stock	8-Aug-23	\$359.42	\$364.25	\$358.85	\$363.73	1,400

Figure 17: Consequence of Incorrect Filters