import pandas as pd

import pandas as pd

df=pd.read\_excel('/content/mega\_data\_cleaning\_dataset.xlsx')
df

	Customer_ID	Name	Age	Gender	Country	State	City	Email	Signup_Date	Account_
0	1191	Larry Wallace	31	Other	NaN	Arkansas	Janetfort	gonzalezbrandi@shaffer- lambert.com	2021-05-23	I
1	8287	Shawn Palmer	20	Male	Uganda	Texas	Smithhaven	davidmendoza@hotmail.com	2025-05-18	
2	6574	Daniel Cortez	105	Mle	Tajikistan	Montana	West Jennifermouth	hoffmancole@yahoo.com	2025-05-19	
3	3377	Cindy Barber	100	Female	Chile	Ohio	Staceyberg	carpenterlinda@yahoo.com	2024-08-19	
4	5107	William Patel	110	Mle	Timor- Leste	Hawaii	South Hollyfort	blairivan@lyons- christensen.org	2020-05-04	
9995	8287	Deborah Garcia	11	Mle	Cape Verde	Maine	Lake Albert	timothy71@hotmail.com	2025-02-18	ı
9996	8932	Donald Pineda	69	Female	NaN	Pennsylvania	Raymondbury	gsmith@hotmail.com	2022-07-03	
9997	6328	Alexandria Moore	-5	Other	Cocos (Keeling) Islands	Pennsylvania	Port Frank	morgansamantha@hotmail.com	2023-03-01	ŀ
9998	8121	NaN	110	Male	Equatorial Guinea	Maine	Jacquelinefort	courtneybradley@day- gilbert.com	2022-11-20	I
9999	2851	Kathleen Leblanc	67	Mle	Albania	Virginia	South Michelle	kristincook@thompson- campbell.info	2024-04-01	ı
10000 r	ows × 25 colum	nns								

df.drop\_duplicates()

	Customer_ID	Name	Age	Gender	Country	State	City	Email	Signup_Date	Account_S
0	1191	Larry Wallace	31	Other	NaN	Arkansas	Janetfort	gonzalezbrandi@shaffer- lambert.com	2021-05-23	lr
1	8287	Shawn Palmer	20	Male	Uganda	Texas	Smithhaven	davidmendoza@hotmail.com	2025-05-18	
2	6574	Daniel Cortez	105	Mle	Tajikistan	Montana	West Jennifermouth	hoffmancole@yahoo.com	2025-05-19	
3	3377	Cindy Barber	100	Female	Chile	Ohio	Staceyberg	carpenterlinda@yahoo.com	2024-08-19	
4	5107	William Patel	110	Mle	Timor- Leste	Hawaii	South Hollyfort	blairivan@lyons- christensen.org	2020-05-04	
9995	8287	Deborah Garcia	11	Mle	Cape Verde	Maine	Lake Albert	timothy71@hotmail.com	2025-02-18	Ir

df.drop\_duplicates(subset=['Customer\_ID'], keep='first',inplace=True) Customer ID State City Email Signup\_Date Account\_Status Name Gender Country Age gonzalezbrandi@shaffer-Larry 0 1191 Arkansas Janetfort 2021-05-23 31 Other NaN Inactive Wallace lambert.com Shawn NaN 2010 Palmer Courtneybradley@day-Texaldaine Sruiabhaetimefoutavidmendoza@hotmail.com 2025-0520222-11-20 gilbert.com 8227 9998 MMele NaNr West Daniel 2 6574 105 Mle Tajikistan Montana hoffmancole@yahoo.com 2025-05-19 Active Jennifermouth Cortez 10000 rows × 25 columns Cindy 100 3 3377 Female Chile Ohio Staceyberg carpenterlinda@yahoo.com 2024-08-19 Active Barber William Timor-South blairivan@lyons-5107 110 Mle Hawaii 2020-05-04 NaN Patel Hollyfort Leste christensen.org Tyler 9991 2919 44 Female Indiana Tylerville ashley87@yahoo.com 2021-10-23 NaN Guam Hunter Harry West 9993 8538 108 Female Texas uhayes@clark-webb.com 2023-09-30 Active Tokelau Carter Annaberg Deborah East 9994 1905 128 Tuvalu Tennessee james28@yahoo.com 2020-05-04 NaN Anthonytown Young courtneybradley@day-Equatorial 9998 8121 NaN 110 Male Maine Jacquelinefort 2022-11-20 Inactive Guinea gilbert.com Kathleen South kristincook@thompson-9999 2851 67 Mle Albania Virginia 2024-04-01 Inactive Leblanc Michelle campbell.info 6172 rows × 25 columns

df.drop\_duplicates(subset='Product\_ID', keep='first')
df

			- 1 7							
Account_Status	Signup_Date	Email	City	State	Country	Gender	Age	Name	Customer_ID	
Inactive	2021-05-23	gonzalezbrandi@shaffer- lambert.com	Janetfort	Arkansas	NaN	Other	31	Larry Wallace	1191	0
NaN	2025-05-18	davidmendoza@hotmail.com	Smithhaven	Texas	Uganda	Male	20	Shawn Palmer	8287	1
Active	2025-05-19	hoffmancole@yahoo.com	West Jennifermouth	Montana	Tajikistan	Mle	105	Daniel Cortez	6574	2
Active	2024-08-19	carpenterlinda@yahoo.com	Staceyberg	Ohio	Chile	Female	100	Cindy Barber	3377	3
NaN	2020-05-04	blairivan@lyons- christensen.org	South Hollyfort	Hawaii	Timor- Leste	Mle	110	William Patel	5107	4
NaN	2021-10-23	ashley87@yahoo.com	Tylerville	Indiana	Guam	Female	44	Tyler Hunter	2919	9991
Active	2023-09-30	uhayes@clark-webb.com	West Annaberg	Texas	Tokelau	Female	108	Harry Carter	8538	9993
NaN	2020-05-04	james28@yahoo.com	East Anthonytown	Tennessee	Tuvalu	f	128	Deborah Young	1905	9994
Inactive	2022-11-20	courtneybradley@day- gilbert.com	Jacquelinefort	Maine	Equatorial Guinea	Male	110	NaN	8121	9998
Inactive	2024-04-01	kristincook@thompson- campbell.info	South Michelle	Virginia	Albania	Mle	67	Kathleen Leblanc	2851	9999

df['Name'] = df['Name'].fillna('Unknown')
df

Account_Status	Signup_Date	Email	City	State	Country	Gender	Age	Name	Customer_ID	
Inactive	2021-05-23	gonzalezbrandi@shaffer- lambert.com	Janetfort	Arkansas	NaN	Other	31	Larry Wallace	1191	0

	Customer_ID	Palmer Name	Age	Gender	Country	State	City	Email	Signup_Date	Account_Stati
0	1191	Larry Wallace	31	Other	NaN	Arkansas	Janetfort	gonzalezbrandi@shaffer- lambert.com	2021-05-23	Inactiv
3 1	3377 8287	Cindy Shawn Barber Palmer	100 20	Female Male	Chile Uganda	Ohio Texas	Staceyberg Smithhaven	carpenterlinda@yahoo.com davidmendoza@notmail.com	2024-08-19 2025-05-18	Activ Na
4	5107	William	110	Mle	Timor-	Hawaii	South	blairivan@lyons-	2020-05-04	Na
2	6574	Daniel Cortez	105	Mle	Tajikistan	Montana	West Jennifermouth	hoffmancole@yahoo.com	2025-05-19	Activ
9991 3	2919 3377	Tyler Hainder Barber	44 100	Female Female	Guam Chile	Indiana Ohio	Tylerville Staceyberg	ashley87@yahoo.com carpenterlinda@yahoo.com	2021-10-23 2024-08-19	Na Activ
4	5107	William Patel	110	Mle	Timor- Leste	Hawaii	South Hollyfort	blairivan@lyons- christensen.org	2020-05-04	Na
9994	1905	Deborah Young	128	··f	Tuvalu	Tennessee	East Anthonvtown	james28@yahoo.com	2020-05-04	Na
9991	2919	Tyler Hunter	44	Female	Guam	Indiana	Tylerville	ashley87@yahoo.com	2021-10-23	Na
					Guinea		•	gilbert.com		
9993	8538	Harry	108	Female	Tokelau	Texas	West	uhayes@clark-webb.com	2023-09-30	Activ
9999	2851	Carter Kathleen Leblanc	67	Mle	Albania	Virginia	Annaberg South Michelle	kristincook@thompson- campbell.info	2024-04-01	Inactiv
9994	1905	Deborah Young	128	f	Tuvalu	Tennessee	East Anthonytown	james28@yahoo.com	2020-05-04	Na
9998	8121	Unknown	110	Male	Equatorial Guinea	Maine	Jacquelinefort	courtneybradley@day- gilbert.com	2022-11-20	Inactiv
9999	2851	Kathleen Leblanc	67	Mle	Albania	Virginia	South Michelle	kristincook@thompson- campbell.info	2024-04-01	Inactiv

df['Product\_Name'] = df['Product\_Name'].fillna('Misc')
df

	Customer_ID	Name	Age	Gender	Country	State	City	Email	Signup_Date	Account_Status
0	1191	Larry Wallace	31	Other	NaN	Arkansas	Janetfort	gonzalezbrandi@shaffer- lambert.com	2021-05-23	Inactive
1	8287	Shawn Palmer	20	Male	Uganda	Texas	Smithhaven	davidmendoza@hotmail.com	2025-05-18	NaN
2	6574	Daniel Cortez	105	Mle	Tajikistan	Montana	West Jennifermouth	hoffmancole@yahoo.com	2025-05-19	Active
3	3377	Cindy Barber	100	Female	Chile	Ohio	Staceyberg	carpenterlinda@yahoo.com	2024-08-19	Active

df['Category'] = df['Category'].fillna('Misc') df Customer\_ID Age Gender Country State Citÿ Email Signup\_Datë Account\_Status gonzalezbrandi@shaffer-Larry 0 1191 31 Other NaN Arkansas Janetfort 2021-05-23 Inactive Wallace lambert.com Harry West 9993 8538 108 2023-09-30 Female Tokelau Texas uhayes@clark-webb.com Active Carter Annaberg Shawn Smithhaven East 8287 20 Male 2025-05-18 NaN 1 Uganda Texas davidmendoza@hotmail.com DBapmak 9994 1905 128 f Tuvalu Tennessee james28@yahoo.com 2020-05-04 NaN Anthonytown Young Daniel West 2 6574 105 Mle Tajikistan Montana hoffmancole@yahoo.com 2025-05-19 Active Jennifermouth Cortez kristincook@thompson-carpenterlinda@yahseligaf8 South Kathleen 9999 3857 160 Female Albania Virginia 2024-08-99 Inactive Stappyheing Leblane William South blairivan@lyons-Timor-5107 110 2020-05-04 NaN Hawaii Patel Leste Hollyfort christensen.org Tyler 9991 2919 44 Female Guam Indiana Tylerville ashley87@yahoo.com 2021-10-23 NaN Hunter West Harry 9993 8538 108 Female Tokelau Texas uhayes@clark-webb.com 2023-09-30 Active Carter Annaberg Deborah East 1905 9994 128 f 2020-05-04 Tuvalu Tennessee james28@yahoo.com NaN Young Anthonytown Equatorial courtneybradley@day-9998 8121 110 2022-11-20 Unknown Male Maine Jacquelinefort Inactive Guinea gilbert.com Kathleen South kristincook@thompson-9999 2851 67 Mle Albania Virginia 2024-04-01 Inactive Leblanc Michelle campbell.info 6172 rows × 25 columns

df['Feedback\_Score'] = df.groupby('Product\_ID')['Feedback\_Score'].transform(lambda x: x.fillna(x.median()))
df

	Customer_ID	Name	Age	Gender	Country	State	City	Email	Signup_Date	Account_S
0	1191	Larry Wallace	31	Other	NaN	Arkansas	Janetfort	gonzalezbrandi@shaffer- lambert.com	2021-05-23	In
1	8287	Shawn Palmer	20	Male	Uganda	Texas	Smithhaven	davidmendoza@hotmail.com	2025-05-18	
2	6574	Daniel Cortez	105	Mle	Tajikistan	Montana	West Jennifermouth	hoffmancole@yahoo.com	2025-05-19	
3	3377	Cindy Barber	100	Female	Chile	Ohio	Staceyberg	carpenterlinda@yahoo.com	2024-08-19	
4	5107	William Patel	110	Mle	Timor- Leste	Hawaii	South Hollyfort	blairivan@lyons- christensen.org	2020-05-04	
		 Tulor			•••					
9991	2919	Tyler Hunter	44	Female	Guam	Indiana	Tylerville	ashley87@yahoo.com	2021-10-23	
9993	8538	Harry Carter	108	Female	Tokelau	Texas	West Annaberg	uhayes@clark-webb.com	2023-09-30	
9994	1905	Deborah	128	f	Tuvalu	Tennessee	East	james28@yahoo.com	2020-05-04	
df['Qu df	antity'] = d		y'].f	fillna(1)	)		Aninonvioum	g		
	Customer_ID	Name	Age	Gender	Country	State	City	Email	Signup_Date	Account_S
<b>0</b> 6172 rd	1191 ows × 25 column	Larry Wallace	31	Other	NaN	Arkansas	Janetfort	gonzalezbrandi@shaffer- lambert.com	2021-05-23	lr
		Wallace	31	Other	NaN Uganda	Arkansas Texas			2021-05-23 2025-05-18	lr
6172 rc	ws × 25 column	Wallace ns Shawn						lambert.com		
6172 rc	ws × 25 columr 8287	Wallace as Shawn Palmer Daniel	20	Male	Uganda	Texas	Smithhaven West	lambert.com davidmendoza@hotmail.com	2025-05-18	
6172 rd 1	8287 6574	Wallace as Shawn Palmer Daniel Cortez Cindy	20	Male Mle	Uganda Tajikistan	Texas Montana	Smithhaven  West Jennifermouth	lambert.com davidmendoza@hotmail.com hoffmancole@yahoo.com	2025-05-18 2025-05-19	
6172 rd	8287 6574 3377	Wallace as Shawn Palmer  Daniel Cortez  Cindy Barber  William Patel	20 105 100	Male Mle Female	Uganda Tajikistan Chile Timor-	Texas Montana Ohio	Smithhaven  West Jennifermouth  Staceyberg  South	lambert.com davidmendoza@hotmail.com hoffmancole@yahoo.com carpenterlinda@yahoo.com blairivan@lyons-	2025-05-18 2025-05-19 2024-08-19	
6172 rd 1 2 3	8287 6574 3377 5107	Wallace as Shawn Palmer  Daniel Cortez  Cindy Barber  William Patel	20 105 100	Male Mle Female Mle	Uganda Tajikistan Chile Timor- Leste	Texas  Montana  Ohio  Hawaii	Smithhaven  West Jennifermouth  Staceyberg  South Hollyfort	lambert.com  davidmendoza@hotmail.com  hoffmancole@yahoo.com  carpenterlinda@yahoo.com  blairivan@lyons- christensen.org	2025-05-18 2025-05-19 2024-08-19 2020-05-04	
6172 rd 1 2 3 4	8287 6574 3377 5107	Wallace as Shawn Palmer  Daniel Cortez  Cindy Barber  William Patel Tyler	20 105 100 110 	Male  Mle  Female  Mle	Uganda Tajjikistan Chile Timor- Leste	Texas  Montana  Ohio  Hawaii	Smithhaven  West Jennifermouth  Staceyberg  South Hollyfort	lambert.com  davidmendoza@hotmail.com  hoffmancole@yahoo.com  carpenterlinda@yahoo.com  blairivan@lyons- christensen.org	2025-05-18 2025-05-19 2024-08-19 2020-05-04	
6172 rd  1  2  3  4 9991	8287 6574 3377 5107  2919	Wallace as Shawn Palmer  Daniel Cortez  Cindy Barber  William Patel Tyler Hunter  Harry	20 105 100 110 	Male  Mle  Female  Mle   Female	Uganda Tajikistan Chile Timor- Leste Guam Tokelau	Texas  Montana  Ohio  Hawaii   Indiana	Smithhaven  West Jennifermouth  Staceyberg  South Hollyfort   Tylerville  West	lambert.com  davidmendoza@hotmail.com  hoffmancole@yahoo.com  carpenterlinda@yahoo.com  blairivan@lyons- christensen.org   ashley87@yahoo.com	2025-05-18  2025-05-19  2024-08-19  2020-05-04   2021-10-23	
6172 rd  1  2  3  4   9991	8287 6574 3377 5107  2919	Wallace  Shawn Palmer  Daniel Cortez  Cindy Barber  William Patel   Tyler Hunter  Harry Carter  Deborah	20 105 100 110  44 108	Male  Mile  Female   Female	Uganda Tajikistan Chile Timor- Leste Guam Tokelau	Texas  Montana  Ohio  Hawaii   Indiana  Texas	Smithhaven  West Jennifermouth  Staceyberg  South Hollyfort   Tylerville  West Annaberg  East	lambert.com  davidmendoza@hotmail.com  hoffmancole@yahoo.com  carpenterlinda@yahoo.com  blairivan@lyons- christensen.org   ashley87@yahoo.com  uhayes@clark-webb.com	2025-05-18  2025-05-19  2024-08-19  2020-05-04   2021-10-23  2023-09-30	
6172 rd  1  2  3  4   9991  9993	8287 6574 3377 5107  2919 8538	Wallace as Shawn Palmer  Daniel Cortez  Cindy Barber  William Patel   Tyler Hunter  Harry Carter  Deborah Young	20 105 100 110  44 108	Male  Mle  Female  Mre   Female	Uganda Tajikistan Chile Timor- Leste Guam Tokelau Tuvalu Equatorial	Texas  Montana  Ohio  Hawaii   Indiana  Texas  Tennessee	Smithhaven  West Jennifermouth  Staceyberg  South Hollyfort   Tylerville  West Annaberg  East Anthonytown	lambert.com  davidmendoza@hotmail.com  hoffmancole@yahoo.com  carpenterlinda@yahoo.com  blairivan@lyons- christensen.org   ashley87@yahoo.com  uhayes@clark-webb.com  james28@yahoo.com  courtneybradley@day-	2025-05-18  2025-05-19  2024-08-19  2020-05-04   2021-10-23  2023-09-30  2020-05-04	In In

df[df['Price'] >= 0]

Account_Stat	Signup_Date	Email	City	State	Country	Gender	Age	Name	Customer_ID	
Inact	2021-05-23	gonzalezbrandi@shaffer- lambert.com	Janetfort	Arkansas	NaN	Other	31	Larry Wallace	1191	0
N	2025-05-18	davidmendoza@hotmail.com	Smithhaven	Texas	Uganda	Male	20	Shawn Palmer	8287	1
Act	2025-05-19	hoffmancole@yahoo.com	West Jennifermouth	Montana	Tajikistan	Mle	105	Daniel Cortez	6574	2
Act	2024-08-19	carpenterlinda@yahoo.com	Staceyberg	Ohio	Chile	Female	100	Cindy Barber	3377	3
N	2020-05-04	blairivan@lyons- christensen.org	South Hollyfort	Hawaii	Timor- Leste	Mle	110	William Patel	5107	4
N	2021-10-23	ashley87@yahoo.com	Tylerville	Indiana	Guam	Female	44	Tyler Hunter	2919	9991
Act	2023-09-30	uhayes@clark-webb.com	West Annaberg	Texas	Tokelau	Female	108	Harry Carter	8538	9993
N	2020-05-04	james28@yahoo.com	East Anthonytown	Tennessee	Tuvalu	f	128	Deborah Young	1905	9994
Inact	2022-11-20	courtneybradley@day- gilbert.com	Jacquelinefort	Maine	Equatorial Guinea	Male	110	Unknown	8121	9998
	2024-04-01	kristincook@thompson- campbell.info	South Michelle	Virginia	Albania	Mle	67	Kathleen Leblanc	2851	9999

df[df['Price'] > 0]

	Customer_ID	Name	Age	Gender	Country	State	City	Email	Signup_Date	Account_S
0	1191	Larry Wallace	31	Other	NaN	Arkansas	Janetfort	gonzalezbrandi@shaffer- lambert.com	2021-05-23	lı
111	8287	Shawn Palmer	20	Male	Uganda	Texas	Smithhaven	_davidmendoza@hotmail.com	2025-05-18	
df[df	['Quantity']	>= 0]								
2	Customer_ID	DARME	Age	Gender	Country	State	Ketik	Email	Signup_Date	Account_S
0	1191	Larry Wallace	31	Other	NaN	Arkansas	Janetfort	gonzalezbrandi@shaffer- lambert.com	2021-05-23	lı
v	0011	Barber	100	i cinaic	Ormo	Onio	Claseyberg	oarpointoimida@yarioo.oom	ZUZT-UU-1U	
4	<del>8787</del>	Wilfayfi Palmer	170	Male	U <b>gand</b> a Leste	Hawan	Smith।ऽश्रासी Hollyfort	davidmendo adii Netrali Vebri christensen.org	2025-05-04	
2	6574	Daniel Cortez	105	Mle	Tajikistan	Montana	West Jennifermouth	hoffmancole@yahoo.com	2025-05-19	
9993	8638	Cliandy Banter	108	Female	TolGhide	Tekais	Staceyberg Annaberg	catthenyles/inda@yabbb.com	2024-09-39	
4	5107	William Patel	110	Mle	Timor- Leste	Hawaii	South Hollyfort	blairivan@lyons- christensen.org	2020-05-04	
9998	8121	Unknown	110	Malë	Equatorial	Maine	Jacquelinefort	courtneybradley@day-	2022-11-20	lı
9991	2919	Tyler Hunter	44	Female	Guam	Indiana	Tylerville	ashley87@yahoo.com	2021-10-23	
9999 9993	2851 8538	Kathleen Le <b>plan</b> ç Carter	67 108	Mle Female	Albania Tokelau	Virginia Texas	South Mio <b>hહીક્</b> Annaberg	kristincook@thompson- campbell.info uhayes@clark-webb.com	2024-04-01 2023-09-30	lı
5875 rd	ows × 25 column	าร								
9994	1905	Deborah Young	128	f	Tuvalu	Tennessee	East Anthonytown	james28@yahoo.com	2020-05-04	
	8121	Unknown	110	Male	Equatorial Guinea	Maine	Jacquelinefort	courtneybradley@day- gilbert.com	2022-11-20	lı
9998										
9998	2851	Kathleen Leblanc	67	Mle	Albania	Virginia	South Michelle	kristincook@thompson- campbell.info	2024-04-01	In

df[(df['Age'] >= 0) & (df['Age'] <= 120)]</pre>

	Customer_ID	Name	Age	Gender	Country	State	City	Email	Signup_Date	Account_Statu
0	1191	Larry Wallace	31	Other	NaN	Arkansas	Janetfort	gonzalezbrandi@shaffer- lambert.com	2021-05-23	Inactiv
1	8287	Shawn Palmer	20	Male	Uganda	Texas	Smithhaven	davidmendoza@hotmail.com	2025-05-18	Na
2	6574	Daniel Cortez	105	Mle	Tajikistan	Montana	West Jennifermouth	hoffmancole@yahoo.com	2025-05-19	Activ
3	3377	Cindy Barber	100	Female	Chile	Ohio	Staceyberg	carpenterlinda@yahoo.com	2024-08-19	Activ
4	5107	William Patel	110	Mle	Timor- Leste	Hawaii	South Hollyfort	blairivan@lyons- christensen.org	2020-05-04	Na
						***				

9990	Customer_ID	Cassandra C <b>NAMS</b>	Age	Gender	Country	Mississippi State	West Mark	stanleysarah@harrington.org	Signup_Date	Account_
0	1191	Larry Wallace	31	Other	NaN	Arkansas	Janetfort	gonzalezbrandi@shaffer- lambert.com	2021-05-23	lı
9993	8 <u>538</u>	Harry Shawn Carter Palmer	108	Female Male	Tokelau Uganda	-Texas Texas	West Sm <b>4thhaber</b> g	davidmendoza@hotmail.com	2023-09-30 2025-05-18	
					Farratorial			courtnevbradlev@dav-		
2	6574	Daniel Cortez	105	Mle	Tajikistan	Montana	West Jennifermouth	hoffmancole@yahoo.com	2025-05-19	
9999 3	2851 3377	Kathleen Le <b>6iad</b> y Barber	67 100	Mle Female	Albania Chile	Virginia Ohio	South Michelle Staceyberg	kristincook@thompson- carpenterlinda@yarkoo.com	2024-04-01 2024-08-19	I
4	5107	William Patel	110	Mle	Timor- Leste	Hawaii	South Hollyfort	blairivan@lyons- christensen.org	2020-05-04	
						•••				
9987	2035	Michael Lee	0	Other	Korea	NaN	East Mary	alexanderryan@gmail.com	2023-05-20	В
9990	4038	Cassandra Collins	80	f	Chile	Mississippi	West Mark	stanleysarah@harrington.org	2020-02-24	В
9991	2919	Tyler Hunter	44	Female	Guam	Indiana	Tylerville	ashley87@yahoo.com	2021-10-23	
9993	8538	Harry Carter	108	Female	Tokelau	Texas	West Annaberg	uhayes@clark-webb.com	2023-09-30	
9994	1905	Deborah Young	128	f	Tuvalu	Tennessee	East Anthonytown	james28@yahoo.com	2020-05-04	

df[df['Delivery\_Date'] >= df['Purchase\_Date']]

Account_S	Signup_Date	Email	City	State	Country	Gender	Age	Name	Customer_ID	
In	2021-05-23	gonzalezbrandi@shaffer- lambert.com	Janetfort	Arkansas	NaN	Other	31	Larry Wallace	1191	0
	2025-05-18	davidmendoza@hotmail.com	Smithhaven	Texas	Uganda	Male	20	Shawn Palmer	8287	1
	2020-08-02	yvonne52@hall.com	Samanthachester	Idaho	Germany	Mle	83	Louis Cuevas	1379	10
	2021-09-03	erica26@yahoo.com	New Jamieland	Mississippi	Hong Kong	Male	109	Tracy Reed	7739	11
	2020-08-19	ocruz@yahoo.com	Lake Michael	Nebraska	Rwanda	Mle	15	Lynn Garcia	211	13
	2020-08-18	maria37@gmail.com	Lauraport	Tennessee	Congo	Female	106	Fernando Taylor	329	9983
	2025-06-16	millerkayla@robinson.net	Donaldberg	Texas	India	f	-4	Paul Escobar	2694	9985
В	2023-05-20	alexanderryan@gmail.com	East Mary	NaN	Korea	Other	0	Michael Lee	2035	9987
	2023-09-30	uhayes@clark-webb.com	West Annaberg	Texas	Tokelau	Female	108	Harry Carter	8538	9993

Kathleen kristincook@thompson-df['Gender'] = df['Gender'].replace({'Mle':'Male','m':'Male','f':'Female','Fmale':'Female'})
df

2979 rows × 25 columns

/tmp/ipython-input-1943499802.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row\_indexer,col\_indexer] = value instead

See the caveats in the documentation: <a href="https://pandas.pydata.org/pandas-docs/stable/user\_guide/indexing.html#returning-a-view-ver">https://pandas.pydata.org/pandas-docs/stable/user\_guide/indexing.html#returning-a-view-ver</a> df['Gender'] = df['Gender'].replace({'Mle':'Male','m':'Male','f':'Female','Fmale':'Female'})

	Customer_ID	Name	Age	Gender	Country	State	City	Email	Signup_Date	Account_Status
0	1191	Larry Wallace	31	Other	NaN	Arkansas	Janetfort	gonzalezbrandi@shaffer- lambert.com	2021-05-23	Inactive
1	8287	Shawn Palmer	20	Male	Uganda	Texas	Smithhaven	davidmendoza@hotmail.com	2025-05-18	NaN
2	6574	Daniel Cortez	105	Male	Tajikistan	Montana	West Jennifermouth	hoffmancole@yahoo.com	2025-05-19	Active
3	3377	Cindy Barber	100	Female	Chile	Ohio	Staceyberg	carpenterlinda@yahoo.com	2024-08-19	Active
4	5107	William Patel	110	Male	Timor- Leste	Hawaii	South Hollyfort	blairivan@lyons- christensen.org	2020-05-04	NaN

A <b>9gg3</b> ue in	s tr <b>yging</b> 8t .loc[row_	o be <sup>H</sup> ggy indexelerc	onog ol_in	c <b>pe)</b> naୀର୍ଚ୍ଚ dexer] =	value ins	rom a क्रिक्टिंग stead	Annaberg	uhayes@clark-webb.com	2023-09-30	А
	aveats in ment <b>1790⁄5</b> '	the docum	entat a <b>v</b> n8n	ion: <u>htt</u> tF <b>æmæ</b> lėl	<u>ps://panda</u> .strTuxdadiin	<u>as.pydata.o</u> (Tersmesseet	rg/pandas-docs le() Anthonytown	<u>s/stable/user_guide/indexi</u> james28@yahoo.com	ng.html#retur 2020-05-04	<u>ning-a-view</u>
	stomer_ID	Young Name	Age	Gender	Country	State	Xnthonytown City		Signup_Date	Account_St
0	1191	Larry Wallace	31	Other	NaN	Arkansas	Janetfort	gonzalezbrandi@shaffer- lambert.com	2021-05-23	Ina
9999	2851	Kathleen Leblanc	67	Male	Albania	Virginia	South Michelle	kristincook@thompson- campbell.info	2024-04-01	Ina
1	8287	Shawn Palmer	20	Male	Uganda	Texas	Smithhaven	davidmendoza@hotmail.com	2025-05-18	
	× 25 column	Daniel					West			
2	6574	Cortez	105	Male	Tajikistan	Montana	Jennifermouth	hoffmancole@yahoo.com	2025-05-19	A
3	3377	Cindy Barber	100	Female	Chile	Ohio	Staceyberg	carpenterlinda@yahoo.com	2024-08-19	A
4	5107	William Patel	110	Male	Timor- Leste	Hawaii	South Hollyfort	blairivan@lyons- christensen.org	2020-05-04	
9991	2919	Tyler Hunter	44	Female	Guam	Indiana	Tylerville	ashley87@yahoo.com	2021-10-23	
9993	8538	Harry Carter	108	Female	Tokelau	Texas	West Annaberg	uhayes@clark-webb.com	2023-09-30	A
9994	1905	Deborah Young	128	Female	Tuvalu	Tennessee	East Anthonytown	james28@yahoo.com	2020-05-04	
9998	8121	Unknown	110	Male	Equatorial Guinea	Maine	Jacquelinefort	courtneybradley@day- gilbert.com	2022-11-20	Ina
9999	2851	Kathleen Leblanc	67	Male	Albania	Virginia	South Michelle	kristincook@thompson- campbell.info	2024-04-01	Ina

df['Account\_Status'] = df['Account\_Status'].str.capitalize().replace({'Actve':'Active','Inactiv':'Inactive','Baned':'Banned'})
df

/tmp/ipython-input-2896010401.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row\_indexer,col\_indexer] = value instead

See the caveats in the documentation: <a href="https://pandas.pydata.org/pandas-docs/stable/user\_guide/indexing.html#returning-a-view-ver">https://pandas.pydata.org/pandas-docs/stable/user\_guide/indexing.html#returning-a-view-ver</a> df['Account Status'] = df['Account Status'].str.capitalize().replace({'Actve':'Active','Inactive','Baned':'Banned'})

Account_Statu	Signup_Date	Email	City	State	Country	Gender	Age	Name	Customer_ID	Cu
Inactiv	2021-05-23	gonzalezbrandi@shaffer- lambert.com	Janetfort	Arkansas	NaN	Other	31	Larry Wallace	1191	0
Na	2025-05-18	davidmendoza@hotmail.com	Smithhaven	Texas	Uganda	Male	20	Shawn Palmer	8287	1
Activ	2025-05-19	hoffmancole@yahoo.com	West Jennifermouth	Montana	Tajikistan	Male	105	Daniel Cortez	6574	2
Activ	2024-08-19	carpenterlinda@yahoo.com	Staceyberg	Ohio	Chile	Female	100	Cindy Barber	3377	3
Na	2020-05-04	blairivan@lyons- christensen.org	South Hollyfort	Hawaii	Timor- Leste	Male	110	William Patel	5107	4
Na	2021-10-23	ashley87@yahoo.com	Tylerville	Indiana	Guam	Female	44	Tyler Hunter	2919	991
Activ	2023-09-30	uhayes@clark-webb.com	West Annaberg	Texas	Tokelau	Female	108	Harry Carter	8538	993
Na	2020-05-04	james28@yahoo.com	East Anthonytown	Tennessee	Tuvalu	Female	128	Deborah Young	1905	994
Inactiv	2022-11-20	courtneybradley@day- gilbert.com	Jacquelinefort	Maine	Equatorial Guinea	Male	110	Unknown	8121	998
Inactiv	2024-04-01	kristincook@thompson- campbell.info	South Michelle	Virginia	Albania	Male	67	Kathleen Leblanc	2851	999

 $\label{eq:df_df_df_df_df} df = df[df['Email'].str.contains(r'^[\w\.-]+@[\w\.-]+\.\w+$', na=False)] df$ 

	Customer_ID	Name	Age	Gender	Country	State	City	Email	Signup_Date	Account_Status
0	1191	Larry Wallace	31	Other	NaN	Arkansas	Janetfort	gonzalezbrandi@shaffer- lambert.com	2021-05-23	Inactive
1	8287	Shawn Palmer	20	Male	Uganda	Texas	Smithhaven	davidmendoza@hotmail.com	2025-05-18	NaN
2	6574	Daniel Cortez	105	Male	Tajikistan	Montana	West Jennifermouth	hoffmancole@yahoo.com	2025-05-19	Active
3	3377	Cindy Barber	100	Female	Chile	Ohio	Staceyberg	carpenterlinda@yahoo.com	2024-08-19	Active

•••	Customer_ID	Name	Age	Gender	Country	State	City	Email	Signup_Date	Account_Sta
0	1191	Larry Wallace	31	Other	NaN	Arkansas	Janetfort	gonzalezbrandi@shaffer- lambert.com	2021-05-23	Inac
9993	8538	Carter	108	Female	Tokelau	Texas	Annaberg	uhayes@clark-webb.com	2023-09-30	Ad
1 9994	8287 1905	Shawn D <b>planfah</b> Young	20 128	Male Female	Uganda Tuvalu	Texas Tennessee	Smithhaven Anthonytown	davidmendoza@hotmail.com james28@yahoo.com	2025-05-18 2020-05-04	
2	6574	Daniel Cortez	105	Male	Tajikistan	Montana	West Jennifermouth	hoffmancole@yahoo.com	2025-05-19	A
9999 3	2851 3377	Kathleen Lebland Barber	67 100	Male Female	Albania Chile	Virginia Ohio	South Sta <b>ldeyhelig</b>	kristincook@thompson- carpenterlinda <b>@ரஷ்‰</b> !!d <b>öfa</b>	2024-04-01 2024-08-19	Ina A
4	5107	William Patel	110	Male	Timor- Leste	Hawaii	South Hollyfort	blairivan@lyons- christensen.org	2020-05-04	
9991	2919	Tyler Hunter	44	Female	Guam	Indiana	Tylerville	ashley87@yahoo.com	2021-10-23	
9993	8538	Harry Carter	108	Female	Tokelau	Texas	West Annaberg	uhayes@clark-webb.com	2023-09-30	А
9994	1905	Deborah Young	128	Female	Tuvalu	Tennessee	East Anthonytown	james28@yahoo.com	2020-05-04	
9998	8121	Unknown	110	Male	Equatorial Guinea	Maine	Jacquelinefort	courtneybradley@day- gilbert.com	2022-11-20	Ina
9999	2851	Kathleen Leblanc	67	Male	Albania	Virginia	South Michelle	kristincook@thompson- campbell.info	2024-04-01	Ina

df[df['Feedback\_Score'] < 3]
df</pre>

Account_St	Signup_Date	Email	City	State	Country	Gender	Age	Name	Customer_ID	
lna	2021-05-23	gonzalezbrandi@shaffer- lambert.com	Janetfort	Arkansas	NaN	Other	31	Larry Wallace	1191	0
	2025-05-18	davidmendoza@hotmail.com	Smithhaven	Texas	Uganda	Male	20	Shawn Palmer	8287	1
А	2025-05-19	hoffmancole@yahoo.com	West Jennifermouth	Montana	Tajikistan	Male	105	Daniel Cortez	6574	2
А	2024-08-19	carpenterlinda@yahoo.com	Staceyberg	Ohio	Chile	Female	100	Cindy Barber	3377	3
	2020-05-04	blairivan@lyons- christensen.org	South Hollyfort	Hawaii	Timor- Leste	Male	110	William Patel	5107	4
	2021-10-23	ashley87@yahoo.com	Tylerville	Indiana	Guam	Female	44	Tyler Hunter	2919	9991
А	2023-09-30	uhayes@clark-webb.com	West Annaberg	Texas	Tokelau	Female	108	Harry Carter	8538	9993
	2020-05-04	james28@yahoo.com	East Anthonytown	Tennessee	Tuvalu	Female	128	Deborah Young	1905	9994

df[(df['Customer\_Loyalty']=='VIP') & (df['Total\_Purchase']>1000)]
df

			Gender	Country	State	City	Liidii	Jignup_bacc	Account_Statu
1191	Larry Wallace	31	Other	NaN	Arkansas	Janetfort	gonzalezbrandi@shaffer- lambert.com	2021-05-23	Inact
× 25 column	ıs								
8287	Shawn Palmer	20	Male	Uganda	Texas	Smithhaven	davidmendoza@hotmail.com	2025-05-18	Na
6574	Daniel Cortez	105	Male	Tajikistan	Montana	West Jennifermouth	hoffmancole@yahoo.com	2025-05-19	Acti
3377	Cindy Barber	100	Female	Chile	Ohio	Staceyberg	carpenterlinda@yahoo.com	2024-08-19	Acti
5107	William Patel	110	Male	Timor- Leste	Hawaii	South Hollyfort	blairivan@lyons- christensen.org	2020-05-04	N
2919	Tyler Hunter	44	Female	Guam	Indiana	Tylerville	ashley87@yahoo.com	2021-10-23	N
8538	Harry Carter	108	Female	Tokelau	Texas	West Annaberg	uhayes@clark-webb.com	2023-09-30	Act
1905	Deborah Young	128	Female	Tuvalu	Tennessee	East Anthonytown	james28@yahoo.com	2020-05-04	N
8121	Unknown	110	Male	Equatorial Guinea	Maine	Jacquelinefort	courtneybradley@day- gilbert.com	2022-11-20	Inact
2851	Kathleen Leblanc	67	Male	Albania	Virginia	South Michelle	kristincook@thompson- campbell.info	2024-04-01	Inac
	× 25 column 8287 6574 3377 5107  2919 8538 1905 8121	* 25 columns    8287   Shawn Palmer     6574   Daniel Cortez     3377   Cindy Barber     5107   William Patel         2919   Tyler Hunter     8538   Harry Carter     1905   Deborah Young     8121   Unknown     2851   Kathleen	× 25 columns  × 25 columns  8287 Shawn Palmer 20  6574 Daniel Cortez 105  3377 Cindy Barber 100  5107 William Patel 110	Nallace       31 Other         × 25 columns       Xalace       Xalac	× 25 columns  × 25 columns  8287	× 25 columns  8287 Shawn Palmer 20 Male Uganda Texas  6574 Daniel Cortez 105 Male Tajikistan Montana  3377 Cindy Barber 100 Female Chile Ohio  5107 William Patel 110 Male Timor-Leste Hawaii	× 25 columns  8287 Shawn Palmer 20 Male Uganda Texas Smithhaven  6574 Daniel Cortez 105 Male Tajikistan Montana West Jennifermouth  3377 Cindy Barber 100 Female Chile Ohio Staceyberg  5107 William Patel 110 Male Timor-Leste Hawaii South Hollyfort	× 25 columns  8287 Shawn Palmer 20 Male Uganda Texas Smithhaven davidmendoza@hotmail.com  6574 Daniel Cortez 105 Male Tajikistan Montana West Jennifermouth hoffmancole@yahoo.com  3377 Cindy Barber 100 Female Chile Ohio Staceyberg carpenterlinda@yahoo.com  5107 William Patel 110 Male Timor-Leste Hawaii South Hollyfort christensen.org	x 25 columns  8287 Shawn Palmer 20 Male Uganda Texas Smithhaven davidmendoza@hotmail.com 2025-05-18  6574 Daniel Cortez 105 Male Tajikistan Montana Jennifermouth hoffmancole@yahoo.com 2025-05-19  3377 Cindy Barber 100 Female Chile Ohio Staceyberg carpenterlinda@yahoo.com 2024-08-19  5107 William 110 Male Timor-Leste Hawaii South Hollyfort christensen.org 2020-05-04

df[df['Account\_Status']=='Banned']

	Customer_ID	Name	Age	Gender	Country	State	City	Email	Signup_Date	Account_Sta
0	1191	Larry Wallace	31	Other	NaN	Arkansas	Janetfort	gonzalezbrandi@shaffer- lambert.com	2021-05-23	Ina
1	8287	Shawn Palmer	20	Male	Uganda	Texas	Smithhaven	davidmendoza@hotmail.com	2025-05-18	
2	6574	Daniel Cortez	105	Male	Tajikistan	Montana	West Jennifermouth	hoffmancole@yahoo.com	2025-05-19	А
3	3377	Cindy Barber	100	Female	Chile	Ohio	Staceyberg	carpenterlinda@yahoo.com	2024-08-19	А
4	5107	William Patel	110	Male	Timor- Leste	Hawaii	South Hollyfort	blairivan@lyons- christensen.org	2020-05-04	
9991	2919	Tyler Hunter	44	Female	Guam	Indiana	Tylerville	ashley87@yahoo.com	2021-10-23	
9993	8538	Harry Carter	108	Female	Tokelau	Texas	West Annaberg	uhayes@clark-webb.com	2023-09-30	Д
9994	1905	Deborah Young	128	Female	Tuvalu	Tennessee	East Anthonytown	james28@yahoo.com	2020-05-04	
9998	8121	Unknown	110	Male	Equatorial Guinea	Maine	Jacquelinefort	courtneybradley@day- gilbert.com	2022-11-20	Ina
9999	2851	Kathleen Leblanc	67	Male	Albania	Virginia	South Michelle	kristincook@thompson- campbell.info	2024-04-01	Ina
5975 m	ws × 25 columr	16								

df[(df['Delivery\_Date'] - df['Purchase\_Date']).dt.days > 7]
df

Account_Status	Signup_Date	Email	City	State	Country	Gender	Age	Name	Customer_ID	
Inactive	2021-05-23	gonzalezbrandi@shaffer- lambert.com	Janetfort	Arkansas	NaN	Other	31	Larry Wallace	1191	0
NaN	2025-05-18	davidmendoza@hotmail.com	Smithhaven	Texas	Uganda	Male	20	Shawn Palmer	8287	1

Cus	tomer_ID	Name Cindy	Age	Gender	Country	State	City	Email	Signup_Date	Account_State
0	1191	Larry Wallace	31	Other	NaN	Arkansas	Janetfort	gonzalezbrandi@shaffer- lambert.com	2021-05-23	Inactiv
4	0107	Patel	ΙIU	iviale	Leste	пажаш	Hollyfort	christensen.org	ZUZU-UƏ-U4	INS
Y.	8287	Shawn Palmer	20	Malë	Ugandä	Texäs	Smithhaven	davidmendoza@hotmail.coiii	2025-05-18	Na
9991	2919	Tyler Hunter	44	Female	Guam	Indiana	Tylerville	ashley87@yahoo.com	2021-10-23	Na
2	6574	Daniel Cortez	105	Male	Tajikistan	Montana	West Jennifermouth	hoffmancole@yahoo.com	2025-05-19	Activ
9994	<b>3903</b>	DeGirak Berher	128	Female	тьЮяів	Tenne	Stacey <b>5ast</b> Anthonytown	сагрерамцізда@уанее.сет	202 <del>0</del> -08-02	A <b>rj</b> ģ
4	5107	William Patel	110	Male	Timor- Leste	Hawaii	South Hollyfort	blairivan@lyons- christensen.org	2020-05-04	Na
		 Kathlaan					South	 kristincook@thomnson-		
9991	2919	Tyler Hunter	44	Female	Guam	Indiana	Tylerville	ashley87@yahoo.com	2021-10-23	Na
5875 rows ×	25 column	ıs								
9993	8538	Harry Carter	108	Female	Tokelau	Texas	West Annaberg	uhayes@clark-webb.com	2023-09-30	Activ
9994	1905	Deborah Young	128	Female	Tuvalu	Tennessee	East Anthonytown	james28@yahoo.com	2020-05-04	Na
9998	8121	Unknown	110	Male	Equatorial Guinea	Maine	Jacquelinefort	courtneybradley@day- gilbert.com	2022-11-20	Inactiv
9999	2851	Kathleen Leblanc	67	Male	Albania	Virginia	South Michelle	kristincook@thompson- campbell.info	2024-04-01	Inacti

df[df['Country']=='India']
df

Account	Signup_Date	Liliaii	City	State	Country	Gender	Age	Name	Customer_ID	
I	2021-05-23	gonzalezbrandi@shaffer- lambert.com	Janetfort	Arkansas	NaN	Other	31	Larry Wallace	1191	0
	2025-05-18	davidmendoza@hotmail.com	Smithhaven	Texas	Uganda	Male	20	Shawn Palmer	8287	1
	2025-05-19	hoffmancole@yahoo.com	West Jennifermouth	Montana	Tajikistan	Male	105	Daniel Cortez	6574	2
	2024-08-19	carpenterlinda@yahoo.com	Staceyberg	Ohio	Chile	Female	100	Cindy Barber	3377	3
	2020-05-04	blairivan@lyons- christensen.org	South Hollyfort	Hawaii	Timor- Leste	Male	110	William Patel	5107	4
	2021 10 22	achlay97@yahaa aam	Tylopyillo	Indiana	Guam	Famala	11	Tyler > 10]	'Quantity']	df[df[ df
Account_5	2023-09-30 Signup_Date	uhayes@clark-webb.com Email	Annaberg City	Texas <b>State</b>	Tokelau <b>Country</b>	Female Gender	108 <b>Age</b>	Carter Name	8538 Customer_ID	9993
lı	2021-05-23	gonzalezbrandi@shaffer- lambert.com	Janetfort	Arkansas	NaN	Other	31	Larry Wallace	1191	0
I	2022-11-20	courtneybradley@day- gilbert.com	Jacquelinefort	Maine	Equatorial Guinea	Male	110	Unknown	8121	9998
	2025-05-18	davidmendoza@hotmail.com	Smithhaven	Texas	Uganda	Male	20	Shawn Palmer	8287	1
li	2024-04-01	kristincook@thompson- campbell.info	South Michelle	Virginia	Albania	Male	67	Kathleen Leblanc	2851	9999
	2025-05-19	hoffmancole@yahoo.com	West Jennifermouth	Montana	Tajikistan	Male	105	Daniel Cortez	6574	2
	2024-08-19	carpenterlinda@yahoo.com	Staceyberg	Ohio	Chile	Female	100	Cindy Barber	3377	3
	2020-05-04	blairivan@lyons- christensen.org	South Hollyfort	Hawaii	Timor- Leste	Male	110	William Patel	5107	4
	2021-10-23	ashley87@yahoo.com	Tylerville	Indiana	Guam	Female	44	Tyler Hunter	2919	9991
	2023-09-30	uhayes@clark-webb.com	West Annaberg	Texas	Tokelau	Female	108	Harry Carter	8538	9993
	2020-05-04	james28@yahoo.com	East Anthonytown	Tennessee	Tuvalu	Female	128	Deborah Young	1905	9994
I	2022-11-20	courtneybradley@day- gilbert.com	Jacquelinefort	Maine	Equatorial Guinea	Male	110	Unknown	8121	9998
		kristincook@thompson-	South	Virginia	Albania	Male	67	Kathleen	2851	9999

df[df['Discount'] > 50]

Customer\_ID Name Age Gender Country State City Email Signup\_Date Account\_Status ... Quantity Purchase\_Date Delivery

0 rows × 25 columns

Account_Sta	Signup_Date	Email	City	State	Country	Gender	Age	Name	Customer_ID	
Inac	2021-05-23	gonzalezbrandi@shaffer- lambert.com	Janetfort	Arkansas	NaN	Other	31	Larry Wallace	1191	0
١	2025-05-18	davidmendoza@hotmail.com	Smithhaven	Texas	Uganda	Male	20	Shawn Palmer	8287	1
Ac	2024-08-19	carpenterlinda@yahoo.com	Staceyberg	Ohio	Chile	Female	100	Cindy Barber	3377	3
١	2020-05-04	blairivan@lyons- christensen.org	South Hollyfort	Hawaii	Timor- Leste	Male	110	William Patel	5107	4
1	2024-12-15	jonessusan@gmail.com	South Sheilaborough	NaN	Greenland	Other	62	Kristen Harvey	8213	5
	•••			•••						
N	2021-10-23	ashley87@yahoo.com	Tylerville	Indiana	Guam	Female	44	Tyler Hunter	2919	9991
Ac	2023-09-30	uhayes@clark-webb.com	West Annaberg	Texas	Tokelau	Female	108	Harry Carter	8538	9993
١	2020-05-04	james28@yahoo.com	East Anthonytown	Tennessee	Tuvalu	Female	128	Deborah Young	1905	9994
Inac	2022-11-20	courtneybradley@day- gilbert.com	Jacquelinefort	Maine	Equatorial Guinea	Male	110	Unknown	8121	9998
Inac	2024-04-01	kristincook@thompson- campbell.info	South Michelle	Virginia	Albania	Male	67	Kathleen Leblanc	2851	9999

 $\label{lem:continuity} $$ df.groupby('Customer_ID').apply(lambda \ x:(x['Price']*x['Quantity']).sum()) $$$ 

6

Customer_ID	)
1	3495.80
2	-421.42
3	5907.22
4	2144.52
8	-574.60
9483	1407.56
9487	1453.60
9493	-932.16
9494	6815.40
9496	7894.88
5875 rows × 1	columns

dtype: float64

df.groupby('Product\_ID')['Feedback\_Score'].mean()

```
Feedback_Score
Product_ID
     1
                    3.300000
     2
                    2.953333
     3
                     3.113333
                    2.027778
     4
     5
                     3.950000
                    2.694118
    496
                    3.041667
    497
                    2.181818
    498
    499
                     3.885714
    500
                    3.000000
500 rows × 1 columns
dtype: float64
```

```
df.groupby('Customer_ID')['Category'].apply(lambda x:set(x)=={'Electronics'})
              Category
Customer ID
                  False
      2
                  False
                  False
      4
                  False
      8
                  False
    9483
                  False
    9487
                   True
    9493
                  False
    9494
                   True
    9496
                  False
5875 rows × 1 columns
dtype: bool
```

```
\label{eq:df_df_df_def} $$ df[df['Customer_Loyalty'] == 'VIP'].groupby('Customer_ID').agg({'Total_Purchase': 'sum'}).nlargest(10,'Total_Purchase') $$ df['Customer_Loyalty'] == 'VIP'].groupby('Customer_ID').agg({'Total_Purchase': 'sum'}).nlargest(10,'Total_Purchase') $$ df['Customer_Loyalty'] == 'VIP'].$$ df['Customer_Loyalty']
                                                                                                           Total_Purchase
                                                                                                                                                                                                                                                  Customer_ID
                                                                                                                                                                                                                                                     th
                                 4376
                                                                                                                                                               19896.80
                                 2184
                                                                                                                                                               19848.60
                                      596
                                                                                                                                                               19807.00
                                 7382
                                                                                                                                                               19784.80
                                                                                                                                                               19403.00
                                 5505
                                 6455
                                                                                                                                                               19316.80
                                   1680
                                                                                                                                                               19295.60
                                 7643
                                                                                                                                                               18901.60
                                   1444
                                                                                                                                                               18867.57
                                 5633
                                                                                                                                                               18315.00
```

```
df[df['Customer_ID'].isna()]
```

Customer\_ID Name Age Gender Country State City Email Signup\_Date Account\_Status ... Quantity Purchase\_Date Delivery

0 rows × 25 columns

df[df['Product\_ID'].isna()]

Customer\_ID Name Age Gender Country State City Email Signup\_Date Account\_Status ... Quantity Purchase\_Date Delivery 0 rows × 25 columns

	Customer_ID	Name	Age	Gender	Country	State	City	Email	Signup_Date	Account_St
0	1191	Larry Wallace	31	Other	NaN	Arkansas	Janetfort	gonzalezbrandi@shaffer- lambert.com	2021-05-23	lna
1	8287	Shawn Palmer	20	Male	Uganda	Texas	Smithhaven	davidmendoza@hotmail.com	2025-05-18	
2	6574	Daniel Cortez	105	Male	Tajikistan	Montana	West Jennifermouth	hoffmancole@yahoo.com	2025-05-19	,
3	3377	Cindy Barber	100	Female	Chile	Ohio	Staceyberg	carpenterlinda@yahoo.com	2024-08-19	ļ
4	5107	William Patel	110	Male	Timor- Leste	Hawaii	South Hollyfort	blairivan@lyons- christensen.org	2020-05-04	
9991	2919	Tyler Hunter	44	Female	Guam	Indiana	Tylerville	ashley87@yahoo.com	2021-10-23	
9993	8538	Harry Carter	108	Female	Tokelau	Texas	West Annaberg	uhayes@clark-webb.com	2023-09-30	,
9994	1905	Deborah Young	128	Female	Tuvalu	Tennessee	East Anthonytown	james28@yahoo.com	2020-05-04	
9998	8121	Unknown	110	Male	Equatorial Guinea	Maine	Jacquelinefort	courtneybradley@day- gilbert.com	2022-11-20	In
9999	2851	Kathleen Leblanc	67	Male	Albania	Virginia	South Michelle	kristincook@thompson- campbell.info	2024-04-01	In

df['Discounted\_Price'] = df['Price'] - df['Discount']
df

	Customer_ID	Name	Age	Gender	Country	State	City	Email	Signup_Date	Account_Status
0	1191	Larry Wallace	31	Other	NaN	Arkansas	Janetfort	gonzalezbrandi@shaffer- lambert.com	2021-05-23	Inactive
1	8287	Shawn Palmer	20	Male	Uganda	Texas	Smithhaven	davidmendoza@hotmail.com	2025-05-18	NaN
2	6574	Daniel Cortez	105	Male	Tajikistan	Montana	West Jennifermouth	hoffmancole@yahoo.com	2025-05-19	Active
3	3377	Cindy Barber	100	Female	Chile	Ohio	Staceyberg	carpenterlinda@yahoo.com	2024-08-19	Active
4	5107	William Patel	110	Male	Timor- Leste	Hawaii	South Hollyfort	blairivan@lyons- christensen.org	2020-05-04	NaN
9991	2919	Tyler Hunter	44	Female	Guam	Indiana	Tylerville	ashley87@yahoo.com	2021-10-23	NaN

9994	Customer ID 1905	Deb <b>Norma</b>	<b>Age</b> 128	<b>Gender</b> Female	<b>Country</b> Tuvalu	State Tennessee	<b>CEatsy</b>	Email iames28@vahoo.com	Signup_Date 2020-05-04	Account_Sta
0	1191	Larry Wallace	31	Other	NaN	Arkansas	Janetfort	gonzalezbrandi@shaffer- lambert.com ~	2021-05-23	Inad
99199	2287	Kæhleven Læblanec	80	Male	Uddanda	Vilejinia	Smith South Smith Paven Michelle	davidhendoza@Hompson- campbell.info	2025-05-08	Ina
5875 rc	nwe x 26 column	ic								
2	6574	Daniel Cortez	105	Male	Tajikistan	Montana	West Jennifermouth	hoffmancole@yahoo.com	2025-05-19	A
3	3377	Cindy Barber	100	Female	Chile	Ohio	Staceyberg	carpenterlinda@yahoo.com	2024-08-19	А
4	5107	William Patel	110	Male	Timor- Leste	Hawaii	South Hollyfort	blairivan@lyons- christensen.org	2020-05-04	
9991	2919	Tyler Hunter	44	Female	Guam	Indiana	Tylerville	ashley87@yahoo.com	2021-10-23	
9993	8538	Harry Carter	108	Female	Tokelau	Texas	West Annaberg	uhayes@clark-webb.com	2023-09-30	А
9994	1905	Deborah Young	128	Female	Tuvalu	Tennessee	East Anthonytown	james28@yahoo.com	2020-05-04	
9998	8121	Unknown	110	Male	Equatorial Guinea	Maine	Jacquelinefort	courtneybradley@day- gilbert.com	2022-11-20	Ina
9999	2851	Kathleen Leblanc	67	Male	Albania	Virginia	South Michelle	kristincook@thompson- campbell.info	2024-04-01	Ina

df['Age\_Group'] = pd.cut(df['Age'], [0,12,19,59,120], labels=['Child','Teen','Adult','Senior'])
df

	Customer_ID	Name	Age	Gender	Country	State	City	Email	Signup_Date	Account_Status
0	1191	Larry Wallace	31	Other	NaN	Arkansas	Janetfort	gonzalezbrandi@shaffer- lambert.com	2021-05-23	Inactive
1	8287	Shawn Palmer	20	Male	Uganda	Texas	Smithhaven	davidmendoza@hotmail.com	2025-05-18	NaN
2	6574	Daniel Cortez	105	Male	Tajikistan	Montana	West Jennifermouth	hoffmancole@yahoo.com	2025-05-19	Active
3	3377	Cindy Barber	100	Female	Chile	Ohio	Staceyberg	carpenterlinda@yahoo.com	2024-08-19	Active
4	5107	William Patel	110	Male	Timor- Leste	Hawaii	South Hollyfort	blairivan@lyons- christensen.org	2020-05-04	NaN
9991	2919	Tyler Hunter	44	Female	Guam	Indiana	Tylerville	ashley87@yahoo.com	2021-10-23	NaN
9993	8538	Harry Carter	108	Female	Tokelau	Texas	West Annaberg	uhayes@clark-webb.com	2023-09-30	Active
9994	1905	Deborah Young	128	Female	Tuvalu	Tennessee	East Anthonytown	james28@yahoo.com	2020-05-04	NaN
9998	8121	Unknown	110	Male	Equatorial Guinea	Maine	Jacquelinefort	courtneybradley@day- gilbert.com	2022-11-20	Inactive
9999	2851	Kathleen Leblanc	67	Male	Albania	Virginia	South Michelle	kristincook@thompson- campbell.info	2024-04-01	Inactive

import numpy as np
df['Loyalty\_Level'] = pd.cut(df['Total\_Purchase'], [0,500,1000,5000,np.inf], labels=['Bronze','Silver','Gold','Platinum'])
df

	Customer_ID	Name	Age	Gender	Country	State	City	Email	Signup_Date	Account_Status
0	1191	Larry Wallace	31	Other	NaN	Arkansas	Janetfort	gonzalezbrandi@shaffer- lambert.com	2021-05-23	Inactive

df['Gender\_Code'] = df['Gender'].map({'Male':1, 'Female':2, 'Other':3}) Customer\_ID City Email Signup\_Date Account\_Status Name Age Gender Country State gonzalezbrandi@shaffer-Larry 0 1191 31 Other NaN Arkansas Janetfort 2021-05-23 Inactive Wallace lambert.com Shawn 2025-05-18 1 8287 20 Male Uganda Texas Smithhaven davidmendoza@hotmail.com NaN Palimely 3 3377 100 Female Chile Ohio Staceyberg carpenterlinda@yahoo.com 2024-08-19 Active Daniel West 2 6574 105 2025-05-19 Male Tajikistan Montana hoffmancole@yahoo.com Active Cortez Jennifermouth HITTOI-South มเลเทงลท<sub>ี่</sub>(พูกงูบทร-2020-05-04 2024-08-19 4 3 5107 3377 110 Male Hawaii NaN **Gigth** Statelywerd 100 Female Lessie carpenterlinda@yansencera Barber William Timor-South blairivan@lyons-110 2020-05-04 4 5107 Male Hawaii NaN Patel Leste Hollyfort christensen.org **ชชช**า 2919 44 remaie Guam ındıana ıyıerviile asnieyo / @yanoo.com ZUZ1-1U-Z3 เงลเง Hunter Tyler 9991 2919 44 Female Guam Indiana Tylerville ashley87@yahoo.com 2021-10-23 NaN Hunter Harry West 8538 9993 108 uhayes@clark-webb.com 2023-09-30 Active Female Tokelau Texas Carter Deborah Annaberg East Deborah Fast 9994 1905 128 Female Tuvalu Tennessee james28@yahoo.com 2020-05-04 NaN Young Anthonytown quatorial quatorial Guinea Guinea Inactive Inactive Jacquelinefort Jacquelinefort 9998 9998 8121 8121 Unknown Unknown 110 110 2022-11-20 2022-11-20 Kathleen South kristincook@thompson-9999 2851 67 Virginia Male Albania 2024-04-01 Inactive Leblanc Michelle campbell.info IVIICIICIIC campucii.iiiio 5875 rows × 31 columns

<pre>df['Status_Code'] = df['Account_Status'].map({'Active':1,'Inactive':2,'Banned':3})</pre>
df

5875 rows × 29 columns

	Customer_ID	Name	Age	Gender	Country	State	City	Email	Signup_Date	Account_Stat
0	1191	Larry Wallace	31	Other	NaN	Arkansas	Janetfort	gonzalezbrandi@shaffer- lambert.com	2021-05-23	Inac
1	8287	Shawn Palmer	20	Male	Uganda	Texas	Smithhaven	davidmendoza@hotmail.com	2025-05-18	١
2	6574	Daniel Cortez	105	Male	Tajikistan	Montana	West Jennifermouth	hoffmancole@yahoo.com	2025-05-19	Ad
3	3377	Cindy Barber	100	Female	Chile	Ohio	Staceyberg	carpenterlinda@yahoo.com	2024-08-19	Ac
4	5107	William Patel	110	Male	Timor- Leste	Hawaii	South Hollyfort	blairivan@lyons- christensen.org	2020-05-04	1
							•••			
9991	2919	Tyler Hunter	44	Female	Guam	Indiana	Tylerville	ashley87@yahoo.com	2021-10-23	١
9993	8538	Harry Carter	108	Female	Tokelau	Texas	West Annaberg	uhayes@clark-webb.com	2023-09-30	Ac
9994	1905	Deborah Young	128	Female	Tuvalu	Tennessee	East Anthonytown	james28@yahoo.com	2020-05-04	1
9998	8121	Unknown	110	Male	Equatorial Guinea	Maine	Jacquelinefort	courtneybradley@day- gilbert.com	2022-11-20	Inac
9999	2851	Kathleen Leblanc	67	Male	Albania	Virginia	South Michelle	kristincook@thompson- campbell.info	2024-04-01	Inac

df['Country'] = df['Country'].str.title().str.strip()
df

	Customer_ID	Name	Age	Gender	Country	State	City	Email	Signup_Date	Account_Stat
0	1191	Larry Wallace	31	Other	NaN	Arkansas	Janetfort	gonzalezbrandi@shaffer- lambert.com	2021-05-23	Inac
1	8287	Shawn Palmer	20	Male	Uganda	Texas	Smithhaven	davidmendoza@hotmail.com	2025-05-18	ı
2	6574	Daniel Cortez	105	Male	Tajikistan	Montana	West Jennifermouth	hoffmancole@yahoo.com	2025-05-19	Ad
3	3377	Cindy Barber	100	Female	Chile	Ohio	Staceyberg	carpenterlinda@yahoo.com	2024-08-19	Ad
4	5107	William Patel	110	Male	Timor- Leste	Hawaii	South Hollyfort	blairivan@lyons- christensen.org	2020-05-04	
9991	2919	Tyler Hunter	44	Female	Guam	Indiana	Tylerville	ashley87@yahoo.com	2021-10-23	1
9993	8538	Harry Carter	108	Female	Tokelau	Texas	West Annaberg	uhayes@clark-webb.com	2023-09-30	Ad
9994	1905	Deborah Young	128	Female	Tuvalu	Tennessee	East Anthonytown	james28@yahoo.com	2020-05-04	1
9998	8121	Unknown	110	Male	Equatorial Guinea	Maine	Jacquelinefort	courtneybradley@day- gilbert.com	2022-11-20	Inac
9999	2851	Kathleen Leblanc	67	Male	Albania	Virginia	South Michelle	kristincook@thompson- campbell.info	2024-04-01	Inac

df['Payment\_Type'] = df['Payment\_Type'].str.title().str.strip() df Customer\_ID Gender State City Email Signup\_Date Account\_Status Name Age Country gonzalezbrandi@shaffer-Larry 0 1191 31 Other NaN Arkansas Janetfort 2021-05-23 Inactive Wallace lambert.com Shawn 8287 1 20 2025-05-18 NaN Male Smithhaven davidmendoza@hotmail.com Uganda Texas Palmer West Daniel 2 6574 105 Male Tajikistan Montana hoffmancole@yahoo.com 2025-05-19 Active Cortez Jennifermouth Cindy 3 3377 100 Female Chile Ohio Staceyberg carpenterlinda@yahoo.com 2024-08-19 Active Barber William Timor-South blairivan@lyons-5107 2020-05-04 110 4 Male Hawaii NaN Patel Leste Hollyfort christensen.org Tyler 9991 2919 44 Female Guam Indiana Tylerville ashley87@yahoo.com 2021-10-23 NaN Hunter Harry West 8538 9993 108 Female Tokelau Texas uhayes@clark-webb.com 2023-09-30 Active Carter Annaberg Deborah East 9994 1905 128 Female Tuvalu Tennessee james28@yahoo.com 2020-05-04 NaN Anthonytown Young Equatorial courtneybradley@day-9998 8121 Unknown 110 Male Maine Jacquelinefort 2022-11-20 Inactive gilbert.com Guinea Kathleen South kristincook@thompson-2851 67 9999 Male Albania Virginia 2024-04-01 Inactive Leblanc Michelle campbell.info 5875 rows × 31 columns

df = df.applymap(lambda x: x.strip().lower() if isinstance(x,str) else x)

/tmp/ipython-input-119833090.py:1: FutureWarning: DataFrame.applymap has been deprecated. Use DataFrame.map instead. df = df.applymap(lambda x: x.strip().lower() if isinstance(x,str) else x)

 $\label{lem:continuous} $$ df.groupby('Product_ID').apply(lambda \ x:(x['Price']*x['Quantity']).sum()).nlargest(5) $$ $$ (5) $$ for $x \in \mathbb{R}^n$. The sum of the product $$ (5) $$ for $x \in \mathbb{R}^n$. The sum of the product $$$ ($ 

```
    df.groupby('Customer_ID')['Total_Purchase'].sum().nlargest(5)

    Total_Purchase

    Customer_ID

    7924
    19920.0

    4376
    19896.8

    2184
    19848.6

    5624
    19823.0

    596
    19807.0

    dtype: float64
```

```
df.groupby('Category')['Feedback_Score'].mean()

Feedback_Score

Category

clothing 3.079373

electronics 3.019122

misc 2.937315

dtype: float64
```

```
df['Payment_Type'].value_counts().idxmax()
'debit'
```

```
df.loc[(df['Price']*df['Quantity']).idxmax()]
```

	6971	
Customer_ID	7924	
Name	sydney perkins	
Age	44	
Gender	female	
Country	grenada	
State	north dakota	
City	ethanberg	
Email	aguilarthomas@garcia-calderon.org	
Signup_Date	2020-02-18 00:00:00	
Account_Status	banned	
Product_ID	29	
Product_Name	staff	
Category	electronics	
Price	996.0	
Discount	NaN	
Quantity	20	
Purchase_Date	2025-08-02 00:00:00	
Delivery_Date	2025-05-20 00:00:00	
Payment_Type	debit	
Feedback_Score	1.2	
Comments	NaN	
Customer_Loyalty	new	
Last_Login	2025-10-10 00:00:00	
Signup_Channel	арр	
Total Purchase	19920.0	

```
df.sort_values(by='Delivery_Duration', ascending=False)
dtype: object
```

mer_ID	Name	Age	Gender	Country	State	City	Email	Signup_Date	Acc
8989	kevin walsh	61	female	burundi	massachusetts	lake allison	xwheeler@yahoo.com	2022-07-30	
Product_	ID')['Fee	dback	_Score']	.agg(['max'	,'min'])				
max mir	schmidt n ##			democratic republic		bradleychester			
6896	st iii in	44	male	liberia	washington	brownmouth	kimberly40@yahoo.com	2023-12-15	
0120	unknown	117	male	ethiopia	georgia	west paul	aliciajohnson@yahoo.com	2023-01-18	
		113	male	switzerland	arkansas	rodriguezville	brenda48@james- clarke.com	2020-10-15	
5.3 0.1	1								
5.8 0.3	3 ⊹rin lewis	56	male	south africa	NaN	north josephchester	leslie26@cook.info	2022-10-01	
	michael					aguth			
5.1 0.3	newman	11	male	bahrain	kentucky	anthonytown	walkeramanda@brown.com	2023-07-01	
2487	ıınknown	-1	female	poland	illinois	new keithmouth	jennyferguson@reed.org	2021-10-12	
5.3 0.3									
<b>57.5</b> 32 1.5	evans	10	other	vanuatu	montana	raymondstad	nicholas79@finley.com	2024-06-02	
3011	3 sara watkins	62	male	georgia	utah	terryburgh	gstephens@kim.info	2020-02-20	
	max min 6896 6.0 0.2 5.9 0.3 5.7 0.8 5.3 0.3 5.1 0.3 5.2 0.2 2487 5.3 0.3 5.4 0.3 5.5 0.3 5.6 0.3	8989 kevin walsh  'Product_ID')['Fee schmidt max min schmidt max min 6896 st 11 n n n n n n n n n n n n n n n n n n	8989 kevin walsh 61  Product_ID')['Feedback schmidt max min	8989 kevin walsh 61 female  Product_ID')['Feedback_Score']  schmidt  max min	Revin   Walsh   61   female   burundi     Product_ID')['Feedback_Score'].agg(['max']     Schmidt   democratic   republic	Revin   Walsh   61   female   burundi   massachusetts     Product_ID')['Feedback_Score'].agg(['max', 'min'])     Schmidt   democratic   republic     6896	Revin   Walsh   61   female   burundi   massachusetts   lake allison	Revin   Walsh   61   female   burundi   massachusetts   lake allison   xwheeler@yahoo.com     Product_ID')['Feedback_Score'].agg(['max','min'])     Sohmidt   democratic   republic	R989 kevin walsh 61 female burundi massachusetts lake allison xwheeler@yahoo.com 2022-07-30  Product_ID')['Feedback_Score'].agg(['max','min'])  schmidt democratic republic  6896 st long in the public republic  6896 st long in the pub

df.groupby(['Country','Category'])['Total\_Purchase'].sum() Total\_Purchase Country Category 2381.19 afghanistan clothing 16484.31 electronics misc 69351.28 clothing 33307.00 albania 19355.40 electronics electronics 23990.72 zambia misc 59923.39 zimbabwe clothing 44268.91 electronics 51967.59 39135.66 misc 729 rows × 1 columns dtype: float64