

Lab Cycle-4

```
import pandas as pd
df=pd.read_excel("/content/Adidas_Dataset.xlsx")
df.dropna(axis=1,how="all")
```

1. List all the retailers with retailer id.

```
df[['Retailer','Retailer ID']]
```

Output:

	Retailer	Retailer ID
0	Foot Locker	1185732
1	Foot Locker	1185732
2	Foot Locker	1185732
3	Foot Locker	1185732
4	Foot Locker	1185732
...
9643	Foot Locker	1185732
9644	Foot Locker	1185732
9645	Foot Locker	1185732
9646	Foot Locker	1185732
9647	Foot Locker	1185732

9648 rows × 2 columns

2. List all the retailers in every region.

```
q=df.groupby(["Region"])[["Retailer"]].unique()
print(q)
```

Output:

Southeast

```
{'Amazon', 'Sports Direct', 'Walmart', 'Foot Locker', 'West Gear'}
```

Midwest

```
{'Amazon', 'Sports Direct', 'Foot Locker', 'West Gear', 'Kohl's'}
```

Northeast

```
{'Amazon', 'Sports Direct', 'Walmart', 'Foot Locker', 'West Gear', 'Kohl's'}
```

South

```
{'Amazon', 'Sports Direct', 'Walmart', 'Foot Locker', 'West Gear', 'Kohl's'}
```

West

```
{'Amazon', 'Sports Direct', 'Walmart', 'Foot Locker', 'West Gear', 'Kohl's'}
```

3. List the retailers in every city of a state.

```
a=df.groupby(['City'])["Retailer"].unique()  
print(a)
```

Output:

```
City Albany [West Gear, Kohl's]  
Albuquerque [Kohl's, Sports Direct]  
Anchorage [Amazon, Foot Locker]  
Atlanta [Sports Direct, Foot Locker]  
Baltimore [West Gear, Foot Locker, Sports Direct]  
Billings [Kohl's, Sports Direct]  
Birmingham [Sports Direct, Amazon]  
Boise [Foot Locker, West Gear, Sports Direct]  
Boston [Sports Direct, Amazon]  
Burlington [Amazon, West Gear]  
Charleston [Foot Locker, Sports Direct, West Gear]  
Charlotte [Sports Direct, Amazon]  
Cheyenne [Kohl's, Foot Locker]  
Chicago [Foot Locker, Sports Direct]  
Columbus [Amazon, West Gear]  
Dallas [Sports Direct, Foot Locker]  
Denver [West Gear] Des Moines  
[Foot Locker, West Gear]  
Detroit [Sports Direct, Foot Locker]  
Fargo [Sports Direct, Foot Locker]  
Hartford [Sports Direct, Foot Locker]  
Honolulu [Foot Locker, Walmart, Sports Direct]  
Houston [Sports Direct, Walmart, West Gear]  
Indianapolis [West Gear]  
Jackson [Foot Locker, Walmart, Sports Direct]  
Knoxville [Sports Direct, Foot Locker]  
Las Vegas [West Gear]  
Little Rock [Walmart, West Gear]  
Los Angeles [Kohl's, Foot Locker]  
Louisville [Amazon, Foot Locker]  
Manchester [Amazon, Foot Locker]  
Miami [Foot Locker, West Gear, Sports Direct]  
Milwaukee [West Gear]  
Minneapolis [Foot Locker, Kohl's]  
New Orleans [West Gear, Foot Locker]  
New York [Foot Locker, Walmart, Sports Direct]  
Newark [Kohl's, Sports Direct]  
Oklahoma City [West Gear, Kohl's]  
Omaha [Foot Locker, Sports Direct]  
Orlando [Sports Direct, Walmart, West Gear]
```

Philadelphia [Foot Locker, West Gear]
Phoenix [Foot Locker, Kohl's]
Portland [Amazon, West Gear]
Providence [Foot Locker, Sports Direct]
Richmond [Foot Locker, Sports Direct]
Salt Lake City [West Gear]
San Francisco [West Gear, Kohl's]
Seattle [West Gear, Foot Locker]
Sioux Falls [Foot Locker, Sports Direct]
St. Louis [Foot Locker, West Gear]
Wichita [Kohl's, Foot Locker]
Wilmington [Foot Locker, Kohl's]
Name: Retailer, dtype: object

4. List the products sold by the retailer in every city.

```
a=df.groupby(['City','Retailer'])['Product'].unique()  
print(a)
```

Output:

City Retailer Albany Kohl's [Women's Street Footwear, Women's Athletic Foo... West Gear
[Women's Athletic Footwear, Men's Apparel, Wom... Albuquerque Kohl's [Women's Athletic
Footwear, Men's Apparel, Wom... Sports Direct [Women's Street Footwear, Women's
Athletic Foo... Anchorage Amazon [Women's Apparel, Men's Street Footwear, Men's... ... St.
Louis West Gear [Women's Street Footwear, Women's Athletic Foo... Wichita Foot Locker
[Women's Apparel, Men's Street Footwear, Men's... Kohl's [Women's Athletic Footwear,
Men's Apparel, Wom... Wilmington Foot Locker [Women's Athletic Footwear, Men's
Apparel, Wom... Kohl's [Women's Apparel, Men's Street Footwear, Men's... Name: Product,
Length: 108, dtype: object

5. Find the total sales of every retailer.

```
a=df.groupby(["Retailer"])["Total Sales"].sum()  
print(a)
```

Output:

Retailer Amazon 77698912.0
Foot Locker 220094720.0
Kohl's 102114753.0
Sports Direct 182470997.0
Walmart 74558410.0
West Gear 242964333.0
Name: Total Sales, dtype: float64

6. Find the total sales of the retailers in every city along with profit.

```
a=df.groupby(['Retailer','City'])[['Total Sales','Operating Profit']].sum()  
print(a)
```

Output:

		Total Sales	Operating Profit
Retailer	City		
Amazon	Anchorage	13365025.0	4143804.75
	Birmingham	409091.0	146947.48
	Boston	4193590.0	1375377.31
	Burlington	13380463.0	5376161.02
	Charlotte	3733676.0	1532481.72
...
West Gear	Portland	21934257.0	7712540.80
	Salt Lake City	9696420.0	3873429.10
	San Francisco	33360397.0	9843005.12
	Seattle	24862675.0	6469771.84
	St. Louis	1701133.0	681457.25

108 rows × 2 columns

7. Find the total sales & profit of each product sold by the retailer.

```
a=df.groupby(['Retailer','Product'])[['Total Sales','Operating Profit']].sum()
print(a)
```

Output:

		Total Sales	Operating Profit
Retailer	Product		
Amazon	Men's Apparel	10474770.0	3331443.80
	Men's Athletic Footwear	12011959.0	4518030.11
	Men's Street Footwear	22161652.0	8707658.12
	Women's Apparel	15710639.0	6280071.53
	Women's Athletic Footwear	7935255.0	2701607.74
	Women's Street Footwear	9404637.0	3279692.01
Foot Locker	Men's Apparel	29508995.0	9942404.61

		Total Sales	Operating Profit
Retailer	Product		
	Men's Athletic Footwear	36480415.0	12409221.49
	Men's Street Footwear	57481575.0	23060809.17
	Women's Apparel	43296114.0	17192901.49
	Women's Athletic Footwear	24239624.0	8477313.73
	Women's Street Footwear	29087997.0	9639474.32
	Kohl's Men's Apparel	14164965.0	5945043.20
	Men's Athletic Footwear	17885316.0	5725762.60
	Men's Street Footwear	22421073.0	9219819.89
	Women's Apparel	20315239.0	5596172.50
	Women's Athletic Footwear	12493869.0	4570693.09
Sports Direct	Women's Street Footwear	14834291.0	5753761.30
	Men's Apparel	24825286.0	8723914.71
	Men's Athletic Footwear	30889734.0	11935672.81
	Men's Street Footwear	38672270.0	15837750.43
	Women's Apparel	37113257.0	17832960.67
	Women's Athletic Footwear	23145288.0	9688746.39
Walmart	Women's Street Footwear	27825162.0	10313909.95
	Men's Apparel	11490680.0	3166591.22
	Men's Athletic Footwear	13600404.0	4029257.65
	Men's Street Footwear	14924255.0	5438666.13
	Women's Apparel	15316099.0	6348451.03
	Women's Athletic Footwear	8762792.0	3239052.49
West Gear	Women's Street Footwear	10464180.0	3560034.09
	Men's Apparel	33263936.0	13653632.79
	Men's Athletic Footwear	42805852.0	13228943.53

		Total Sales	Operating Profit
Retailer	Product		
	Men's Street Footwear	53165419.0	20537556.88
	Women's Apparel	47287512.0	15400413.34
	Women's Athletic Footwear	30055068.0	10298371.50
	Women's Street Footwear	36386546.0	12548955.14

8. Find the units sold, total sales & profit of the products sold between the dates 1/1/2020 and 4/15/2020.

```
df[df['Invoice Date'].between('2020-01-01','2020-04-15')][['Product','Units Sold','Total Sales','Operating Profit']]
```

Output:

	Product	Units Sold	Total Sales	Operating Profit
0	Men's Street Footwear	1200	600000.0	300000.00
1	Men's Athletic Footwear	1000	500000.0	150000.00
2	Women's Street Footwear	1000	400000.0	140000.00
3	Women's Athletic Footwear	850	382500.0	133875.00
4	Men's Apparel	900	540000.0	162000.00
...
8275	Women's Apparel	170	9520.0	1713.60
8276	Men's Street Footwear	149	2980.0	1192.00
8277	Men's Athletic Footwear	145	4495.0	1123.75
8278	Women's Street Footwear	128	3328.0	1397.76
8279	Women's Athletic Footwear	96	2496.0	848.64

425 rows × 4 columns

9. Find the no of units sold of each product by each retailer in every city.

```
a=df.groupby(['City','Retailer','Product'])['Units Sold'].sum()
print(a)
```

Output:

City	Retailer	Product
Albany	Kohl's Men's Apparel	1375
	Men's Athletic Footwear	1401
	Men's Street Footwear	2104
	Women's Apparel	1613
	Women's Athletic Footwear	1311
	...	
Wilmington	Kohl's Men's Athletic Footwear	1490
	Men's Street Footwear	2638
	Women's Apparel	1743
	Women's Athletic Footwear	970
	Women's Street Footwear	1525

Name: Units Sold, Length: 618, dtype: int64

10. Find the products with different price per unit in different cities with proper information.

```
a=df.groupby(['Product'])
for i,j in a:
    if(len(set(j['Price per Unit']))!=1):
        print(i)
```

Output:
Men's Apparel
Men's Athletic Footwear
Men's Street Footwear
Women's Apparel
Women's Athletic Footwear
Women's Street Footwear

11. Find the retailers who sold the same product with different prices in different cities.

```
a=df.groupby(['Product','Retailer','City','Invoice Date'])[['Price per Unit']].sum()
print(a)
```

Output:

Product	Retailer	City	Price per Unit	
			Invoice Date	
Men's Apparel	Amazon	Anchorage	2021-02-22	125.0
			2021-03-20	129.0
			2021-04-21	116.0
			2021-05-20	127.0
			2021-06-22	125.0

Product	Retailer	City	Price per Unit	
			Invoice Date	
			2021-07-20	126.0
			2021-08-21	127.0
			2021-09-20	127.0
			2021-10-22	146.0
			2021-11-21	144.0
		Boston	2021-01-14	144.0
			2021-11-14	178.0
			2021-12-13	179.0

12. Find the total sales & profits of all products in every month.

```
l=df['Invoice Date']
month=[]
year=[]
for i in l:
    month.append(i.month)
    year.append(i.year)
df['month']=month
df['year']=year
a=df.groupby(['month','Product'])[['Total Sales','Operating Profit']].sum()
print(a)
```

Output:

		Total Sales	Operating Profit
month	Product		
1	Men's Apparel	10253418.0	4140975.27
	Men's Athletic Footwear	13091636.0	3858129.77
	Men's Street Footwear	15594195.0	6355611.78
	Women's Apparel	13353328.0	3945335.36
	Women's Athletic Footwear	8347337.0	2897686.87
...
12	Men's Athletic Footwear	14260277.0	4933741.04

		Total Sales	Operating Profit
month	Product		
	Men's Street Footwear	21065269.0	8326619.99
	Women's Apparel	16601172.0	6400338.99
	Women's Athletic Footwear	10738917.0	3817987.76
	Women's Street Footwear	11499517.0	4047079.39

72 rows × 2 columns

13. Find the total sales & profit of the products in different sales methods in each city.

```
a=df.groupby(['City','Product','Sales Method'])[['Total Sales','Operating Profit']].sum()
print(a)
```

Output:

			Total Sales	Operating Profit
City	Product	Sales Method		
Albany	Men's Apparel	In-store	3776250.0	1309187.50
		Online	97303.0	45744.58
	Men's Athletic Footwear	In-store	3732500.0	1284375.00
		Online	97096.0	44825.59
	Men's Street Footwear	In-store	5626250.0	2564812.50
	
Wilmington	Women's Apparel	Online	64155.0	33827.95
		In-store	1211250.0	484500.00
	Women's Athletic Footwear	Online	31330.0	16467.12
		In-store	1464750.0	585900.00
	Women's Street Footwear	Online	37547.0	19727.89

672 rows × 2 columns

14. Find the products whose sales raises in every month.

```
df['year']=df['Invoice Date'].dt.year  
df['month']=df['Invoice Date'].dt.month  
a=df.groupby(["Product","year","month"])["Total Sales"].sum()  
a["Total Sales"].is_monotonic_increasing
```

Output:

False

15. Find the retailers whose profit increased every month.

```
a=df.groupby(["Product","year","month"])["Operating Profit"].sum()  
a["Operating Profit"].is_monotonic_increasing
```

Output:

False