

Importing the necessary Modules

```
import pandas as pd
import matplotlib.pyplot as plt
import numpy as np
import seaborn as sns
import plotly.express as px
import plotly.graph_objects as go
```

Reading the Manually Extracted Dataset from SEC's EDGAR's database

<https://www.sec.gov/edgar/searchedgar/cik>

```
data = pd.read_csv('Manually_extract.csv')
```

data

	Year	Total Revenue	Net Income	Total Assets	Total Liabilities	\
0	2023	211915	72361	411976	205753	
1	2022	198270	72738	364840	198298	
2	2021	168088	61271	333779	191791	
3	2023	96773	14974	106618	43009	
4	2022	81462	12556	82338	36440	
5	2021	53821	5519	62131	30548	
6	2023	383285	96995	352583	290437	
7	2022	394328	99803	352755	302083	
8	2021	365817	94680	351002	287912	

	Cash Flow from Operating Activities	Company
0	87582	Microsoft
1	89035	Microsoft
2	76740	Microsoft
3	13256	Tesla
4	14724	Tesla
5	11497	Tesla
6	110543	Apple
7	122151	Apple
8	104038	Apple

Calculating Year-by-Year growth rates for Total Revenue and Net Income

```
data['Revenue Growth (%)'] = data.groupby('Company')['Total Revenue'].pct_change() * 100
data['Net Income Growth (%)'] = data.groupby('Company')['Net Income'].pct_change() * 100
```

data

	Year	Total Revenue	Net Income	Total Assets	Total Liabilities	\
0	2023	211915	72361	411976	205753	
1	2022	198270	72738	364840	198298	
2	2021	168088	61271	333779	191791	
3	2023	96773	14974	106618	43009	
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6	2023	383285	96995	352583	290437	
7	2022	394328	99803	352755	302083	
8	2021	365817	94680	351002	287912	
	Cash Flow from Operating Activities			Company	Revenue Growth (%)	\
0		87582	Microsoft		NaN	
1		89035	Microsoft		-6.438902	
2		76740	Microsoft		-15.222676	
3		13256	Tesla		NaN	
4		14724	Tesla		-15.821562	
5		11497	Tesla		-33.931158	
6		110543	Apple		NaN	
7		122151	Apple		2.881146	
8		104038	Apple		-7.230275	
	Net Income Growth (%)					
0		NaN				
1		0.520999				
2		-15.764800				
3		NaN				
4		-16.147990				
5		-56.044919				
6		NaN				
7		2.894995				
8		-5.133112				

Imputing Null/NaN values that result from pct_change calculations with 0

```
data.fillna(0, inplace=True)
```

```
data
```

	Year	Total Revenue	Net Income	Total Assets	Total Liabilities	\
0	2023	211915	72361	411976	205753	
1	2022	198270	72738	364840	198298	
2	2021	168088	61271	333779	191791	
3	2023	96773	14974	106618	43009	
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7	2022	394328	99803	352755	302083	
8	2021	365817	94680	351002	287912	

	Cash Flow from Operating Activities	Company	Revenue Growth (%)
0	87582	Microsoft	0.000000
1	89035	Microsoft	-6.438902
2	76740	Microsoft	-15.222676
3	13256	Tesla	0.000000
4	14724	Tesla	-15.821562
5	11497	Tesla	-33.931158
6	110543	Apple	0.000000
7	122151	Apple	2.881146
8	104038	Apple	-7.230275

	Net Income Growth (%)
0	0.000000
1	0.520999
2	-15.764800
3	0.000000
4	-16.147990
5	-56.044919
6	0.000000
7	2.894995
8	-5.133112

Approach 1

```
# Calculate year-over-year changes
# Calculate year-over-year changes for each financial metric,
including 2023
data['Revenue Growth (%)'] = data.groupby('Company')['Total
Revenue'].pct_change( periods=1) * 100
```

```

data['Net Income Growth (%)'] = data.groupby('Company')['Net
Income'].pct_change( periods=1) * 100
data['Total Assets Growth (%)'] = data.groupby('Company')['Total
Assets'].pct_change( periods=1) * 100
data['Total Liabilities Growth (%)'] = data.groupby('Company')['Total
Liabilities'].pct_change( periods=1) * 100
data['Cash Flow Growth (%)'] = data.groupby('Company')['Cash Flow from
Operating Activities'].pct_change( periods=1) * 100

```

```

# Display the results

```

```

print(data[['Company', 'Year', 'Revenue Growth (%)', 'Net Income
Growth (%)', 'Total Assets Growth (%)', 'Total Liabilities Growth
(%)', 'Cash Flow Growth (%)']])

```

	Company	Year	Revenue Growth (%)	Net Income Growth (%)	\
0	Microsoft	2023	NaN	NaN	
1	Microsoft	2022	-6.438902	0.520999	
2	Microsoft	2021	-15.222676	-15.764800	
3	Tesla	2023	NaN	NaN	
4	Tesla	2022	-15.821562	-16.147990	
5	Tesla	2021	-33.931158	-56.044919	
6	Apple	2023	NaN	NaN	
7	Apple	2022	2.881146	2.894995	
8	Apple	2021	-7.230275	-5.133112	

	Total Assets Growth (%)	Total Liabilities Growth (%)	Cash Flow Growth (%)
0	NaN	NaN	
1	-11.441443	-3.623276	
1.659017			
2	-8.513595	-3.281425	-
13.809176			
3	NaN	NaN	
4	-22.772890	-15.273547	
11.074231			
5	-24.541524	-16.169045	-
21.916599			
6	NaN	NaN	
7	0.048783	4.009820	
10.500891			
8	-0.496945	-4.691095	-
14.828368			

```

microsoft_df = data[data['Company'] == 'Microsoft']

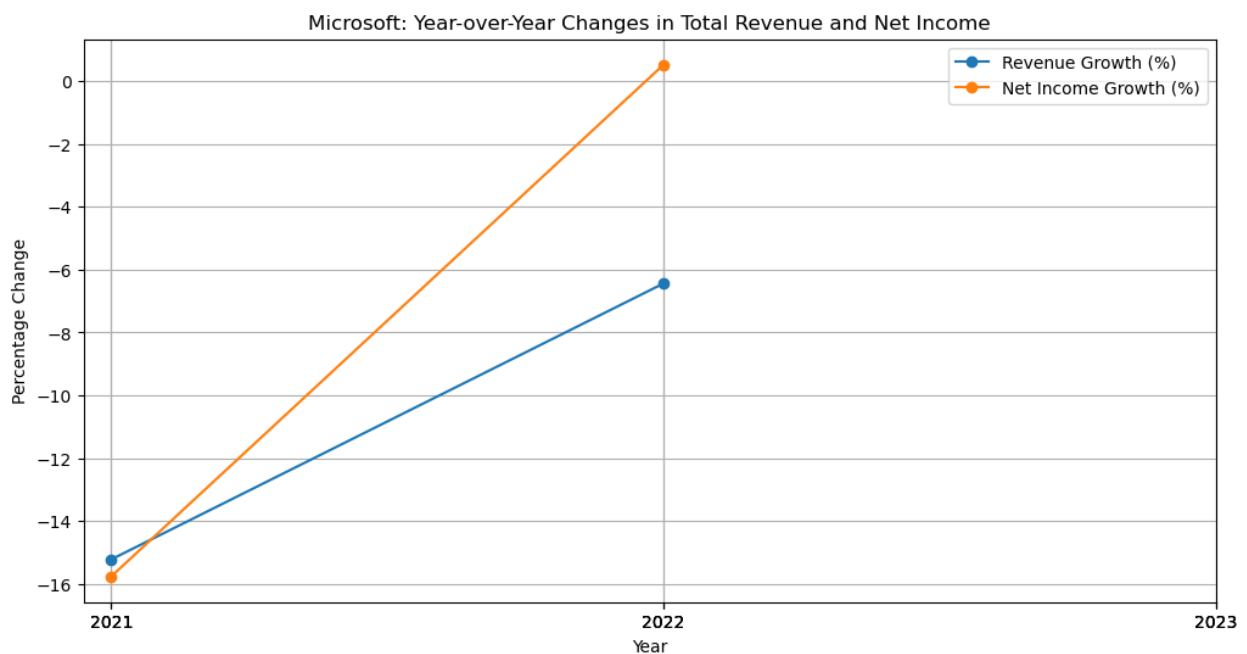
```

```

# Plotting the year-over-year changes for Total Revenue and Net Income

```

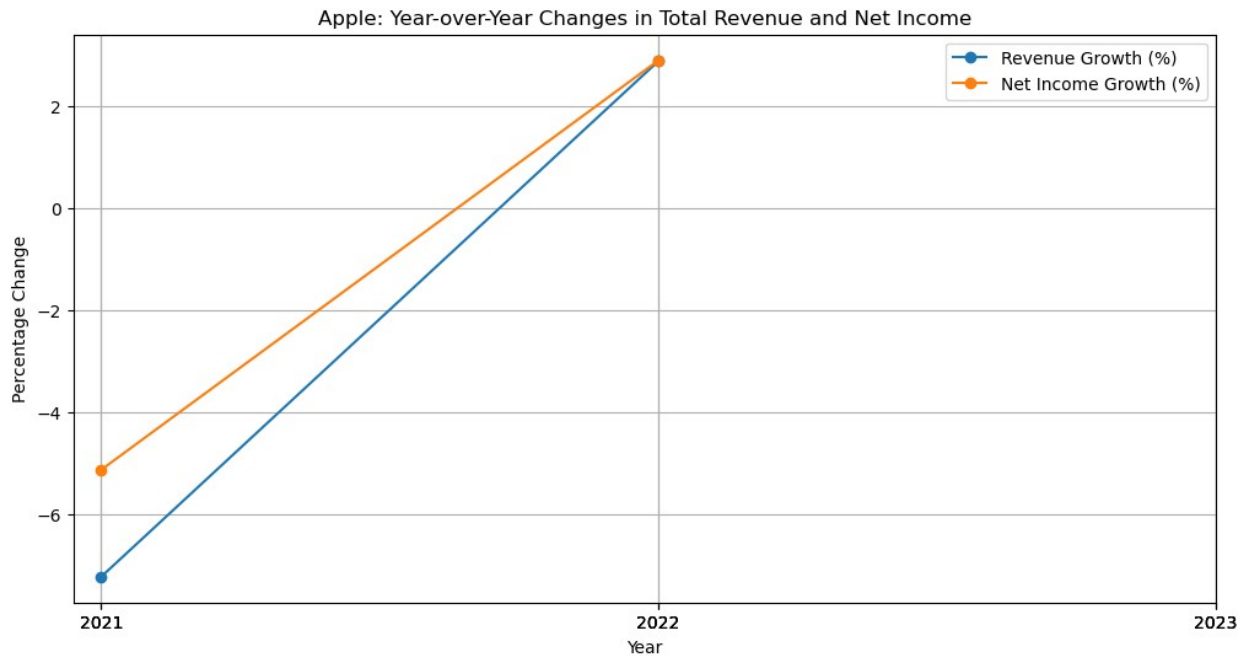
```
plt.figure(figsize=(12, 6))
plt.plot(microsoft_df['Year'], microsoft_df['Revenue Growth (%)'],
marker='o', label='Revenue Growth (%)')
plt.plot(microsoft_df['Year'], microsoft_df['Net Income Growth (%)'],
marker='o', label='Net Income Growth (%)')
plt.xlabel('Year')
plt.ylabel('Percentage Change')
plt.title('Microsoft: Year-over-Year Changes in Total Revenue and Net Income')
plt.legend()
plt.grid(True)
plt.xticks(data['Year'])
plt.show()
```



```
apple_df = data[data['Company'] == 'Apple']

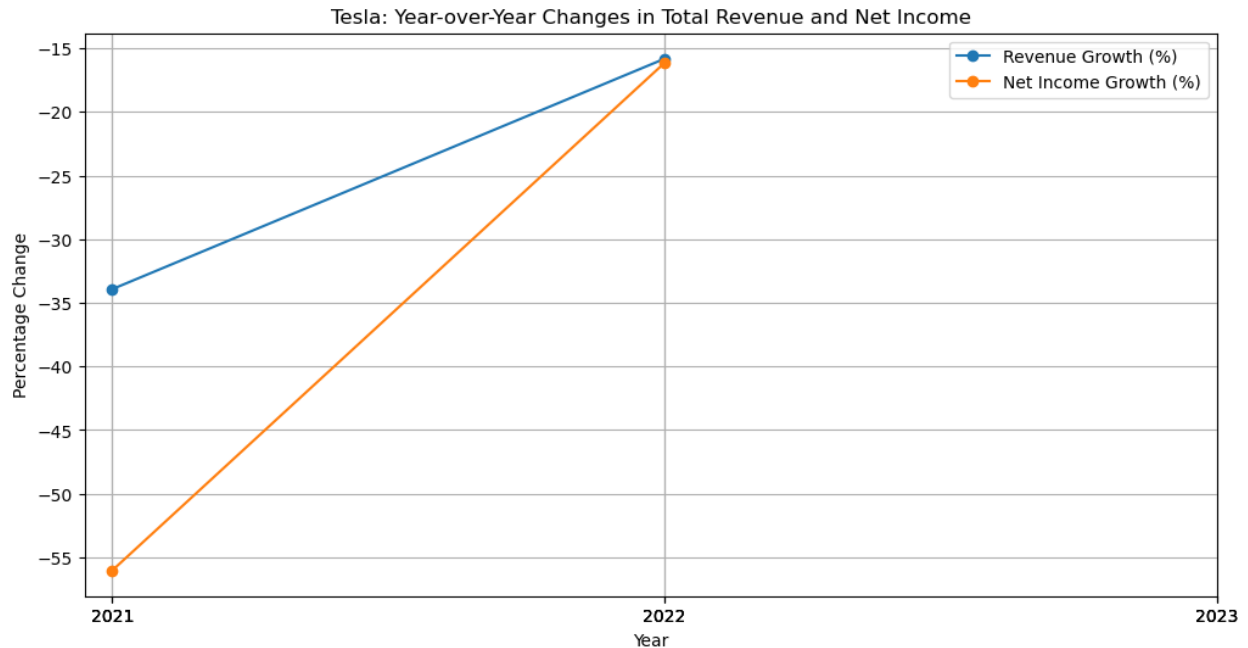
# Plotting the year-over-year changes for Total Revenue and Net Income
plt.figure(figsize=(12, 6))
plt.plot(apple_df['Year'], apple_df['Revenue Growth (%)'], marker='o',
label='Revenue Growth (%)')
plt.plot(apple_df['Year'], apple_df['Net Income Growth (%)'],
marker='o', label='Net Income Growth (%)')
plt.xlabel('Year')
plt.ylabel('Percentage Change')
plt.title('Apple: Year-over-Year Changes in Total Revenue and Net Income')
plt.legend()
plt.grid(True)
```

```
plt.xticks(data['Year'])
plt.show()
```



```
Tesla_df = data[data['Company'] == 'Tesla']

# Plotting the year-over-year changes for Total Revenue and Net Income
plt.figure(figsize=(12, 6))
plt.plot(Tesla_df['Year'], Tesla_df['Revenue Growth (%)'], marker='o',
label='Revenue Growth (%)')
plt.plot(Tesla_df['Year'], Tesla_df['Net Income Growth (%)'],
marker='o', label='Net Income Growth (%)')
plt.xlabel('Year')
plt.ylabel('Percentage Change')
plt.title('Tesla: Year-over-Year Changes in Total Revenue and Net
Income')
plt.legend()
plt.grid(True)
plt.xticks(data['Year'])
plt.show()
```



Approach 2 Calculating Year-by-Year growth rates for Total Assets, Total Liabilities and Cash flow from Operations Activities

```
data['Assets Growth (%)'] = data.groupby('Company')['Total Assets'].pct_change() * 100
data['Liabilities Growth (%)'] = data.groupby('Company')['Total Liabilities'].pct_change() * 100
data['Cash Flow from Operations Growth(%)'] = data.groupby('Company')['Cash Flow from Operating Activities'].pct_change() * 100
```

data

	Year	Total Revenue	Net Income	Total Assets	Total Liabilities	\
0	2023	211915	72361	411976	205753	
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	Cash Flow from Operating Activities	Company	Revenue Growth (%)
0	87582	Microsoft	0.000000
1	89035	Microsoft	-6.438902
2	76740	Microsoft	-15.222676

3	13256	Tesla	0.000000
4	14724	Tesla	-15.821562
5	11497	Tesla	-33.931158
6	110543	Apple	0.000000
7	122151	Apple	2.881146
8	104038	Apple	-7.230275

	Net Income Growth (%)	Assets Growth (%)	Liabilities Growth (%) \
0	0.000000	NaN	NaN
1	0.520999	-11.441443	-3.623276
2	-15.764800	-8.513595	-3.281425
3	0.000000	NaN	NaN
4	-16.147990	-22.772890	-15.273547
5	-56.044919	-24.541524	-16.169045
6	0.000000	NaN	NaN
7	2.894995	0.048783	4.009820
8	-5.133112	-0.496945	-4.691095

	Cash Flow from Operations Growth(%)
0	NaN
1	1.659017
2	-13.809176
3	NaN
4	11.074231
5	-21.916599
6	NaN
7	10.500891
8	-14.828368

`data.fillna(0, inplace=True)`

`data`

	Year	Total Revenue	Net Income	Total Assets	Total Liabilities \
0	2023	211915	72361	411976	205753
1	2022	198270	72738	364840	198298
2	2021	168088	61271	333779	191791
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7	2022	394328	99803	352755	302083
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	Cash Flow from Operating Activities	Company	Revenue Growth (%)
\			
0	87582	Microsoft	0.000000
1	89035	Microsoft	-6.438902
2	76740	Microsoft	-15.222676
3	13256	Tesla	0.000000
4	14724	Tesla	-15.821562
5	11497	Tesla	-33.931158
6	110543	Apple	0.000000
7	122151	Apple	2.881146
8	104038	Apple	-7.230275

	Net Income Growth (%)	Assets Growth (%)	Liabilities Growth (%)	\
0	0.000000	0.000000	0.000000	
1	0.520999	-11.441443	-3.623276	
2	-15.764800	-8.513595	-3.281425	
3	0.000000	0.000000	0.000000	
4	-16.147990	-22.772890	-15.273547	
5	-56.044919	-24.541524	-16.169045	
6	0.000000	0.000000	0.000000	
7	2.894995	0.048783	4.009820	
8	-5.133112	-0.496945	-4.691095	

	Cash Flow from Operations Growth(%)
0	0.000000
1	1.659017
2	-13.809176
3	0.000000
4	11.074231
5	-21.916599
6	0.000000
7	10.500891
8	-14.828368


```

data.to_csv('final_data_report.csv')

summary = data.groupby('Company').agg({
    'Revenue Growth (%)': 'mean',
    'Net Income Growth (%)': 'mean',
    'Assets Growth (%)' : 'mean',
    'Liabilities Growth (%)' : 'mean',

```

```

    'Cash Flow from Operations Growth(%)' : 'mean'
}).reset_index()

print('Year-By-Year Average Growth Rates(%) :-')
print('          OR')
print("Overall Growth/Fall rate for Apple, Microsoft and Tesla from
Fiscal Year 2021 - 2023")
summary

```

Year-By-Year Average Growth Rates(%) :-
OR

Overall Growth/Fall rate for Apple, Microsoft and Tesla from Fiscal
Year 2021 - 2023

	Company	Revenue Growth (%)	Net Income Growth (%)	Assets Growth (%)
0	Apple	-1.449710	-0.746039	-0.149388
1	Microsoft	-7.220526	-5.081267	6.651679
2	Tesla	-16.584240	-24.064303	15.771471

	Liabilities Growth (%)	Cash Flow from Operations Growth(%)
0	-0.227092	-1.442492
1	-2.301567	-4.050053
2	-10.480864	-3.614123

```
summary.to_csv('Summary_final_report.csv')
```