FINAL CAPSTONE PROJECT 2

- In this project, we will visualize stock prices using Seaborn and Matplotlib. The 4 stocks that will be visualized are JP Morgan Chase (JP), Procter and Gamble (P&G) (PG), Apple (AAPL) and United Airlines (UAL).
- Using the “stock_daily_prices.csv” and “stocks_daily_returns.csv” included in the attachment, write Python scripts to perform the following tasks:
  - Import both data using Pandas.
  - Using Matplotlib, plot a lineplot showing all daily prices of 4 stocks in one figure.
  - Using Matplotlib, plot the daily prices of the 4 stocks in several subplots.
  - Using Matplotlib, visualize 4 plots on subplots next to each other (all figures in one row).
  - Using Matplotlib, visualize a scatterplot between Apple's daily returns and JP Morgan's daily returns.
  - Using Seaborn, visualize a scatterplot between Apple's daily returns and JP Morgan's daily returns.
  - Assume that you decide to be bullish on AAPL and you allocate 70% of your assets in it. You also decide to divide your remaining assets equally among other stocks (JPM, PG, and UAL). Using Matplotlib, plot a piechart showing these allocations. Use the ‘explode’ attribute to increase separation between AAPL and the rest of the portfolio.
  - Using Matplotlib, plot histograms for United Airlines and P&G returns using 40 bins in red. Show the average and Standard deviation for both stocks above the image. What do you conclude from the graph?
  - Using Seaborn, plot a heatmap showing the correlation between daily stock returns. Comment on the correlation between UAL and P&G.
  - Create a 3D plot showing all daily returns from JPM, AAPL, and UAL [need to figure out how to do this personally].

In [ ]:
```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline
```

In [ ]:
```
daily_prices_df = pd.read_csv('stocks_daily_prices.csv')
daily_returns_df = pd.read_csv('stocks_daily_returns.csv')
```

In [ ]:
```
daily_prices_df
```

Out[ ]:

	Date	AAPL	JPM	PG	UAL
0	1/2/2008	5.949703	29.448614	47.058838	29.915234
1	1/3/2008	5.952452	29.246094	47.058838	29.690800
2	1/4/2008	5.498071	28.582682	46.870098	31.000002
3	1/7/2008	5.424478	28.868999	47.175980	29.180000
4	1/8/2008	5.229351	27.723747	47.299629	24.389999
...	...	...	...	...	...
3637	6/13/2022	131.880005	115.989998	138.149994	37.020000
3638	6/14/2022	132.759995	114.059998	133.839996	36.990002
3639	6/15/2022	135.429993	115.410004	132.509995	37.889999
3640	6/16/2022	130.059998	113.430000	133.320007	34.779999
3641	6/17/2022	131.559998	113.029999	132.360001	36.279999

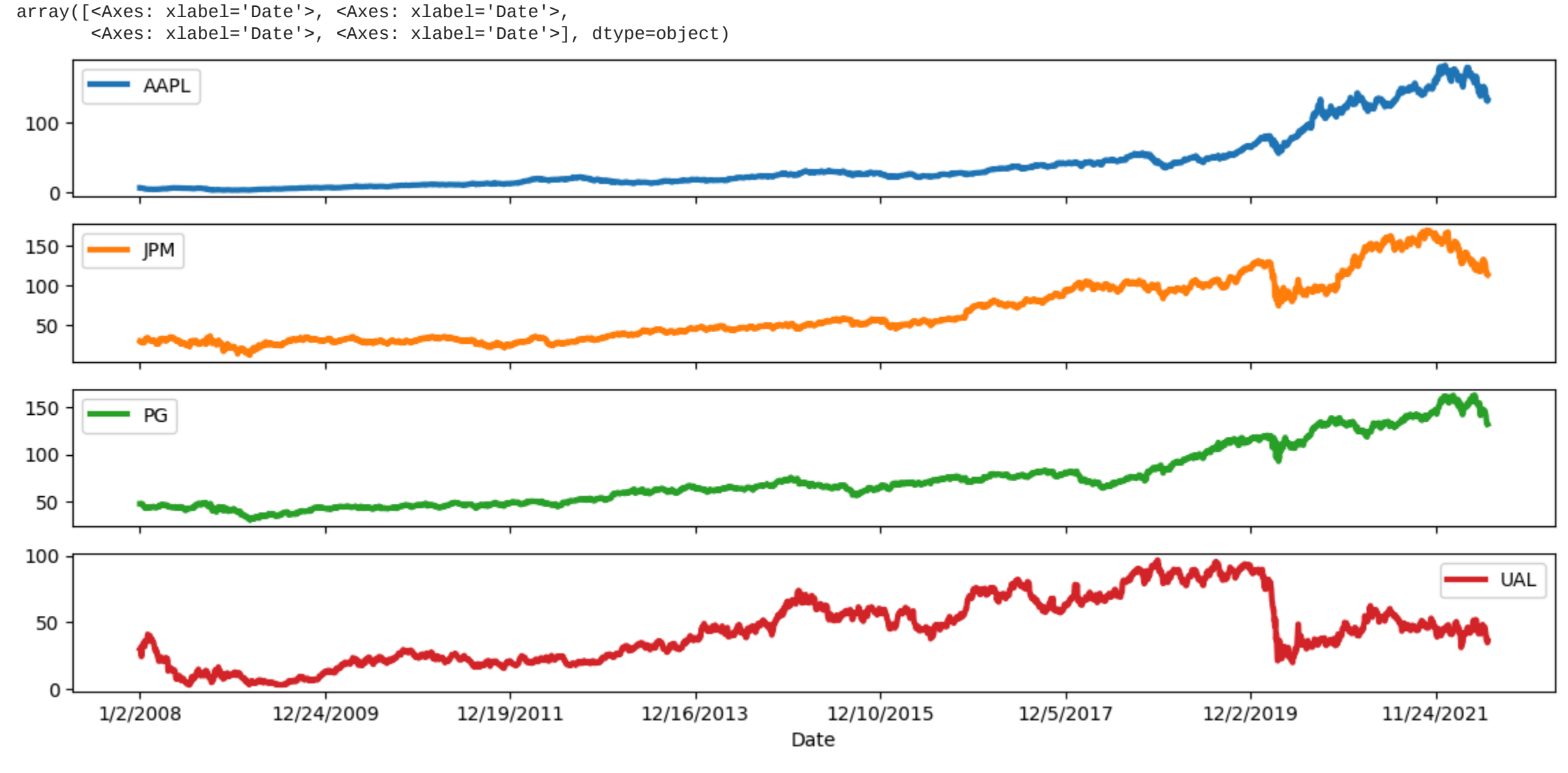
3642 rows × 5 columns

In [ ]:
```
daily_prices_df.plot(x = 'Date', y = [ 'AAPL', 'JPM', 'PG', 'UAL'], linewidth = 3, figsize = (14,6))
```

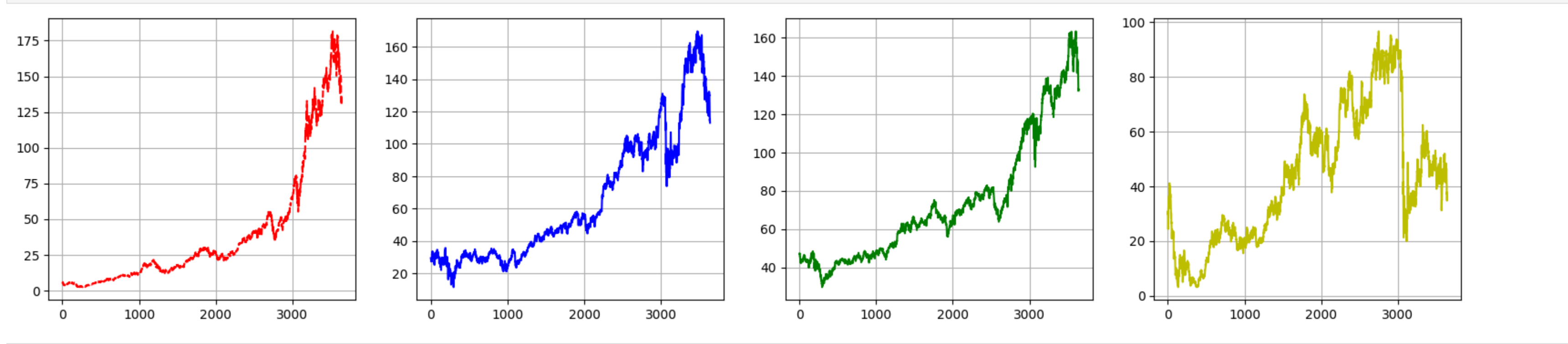
Out[ ]:
```
<Axes: xlabel='Date'>
```

In [ ]:
```
daily_prices_df.plot(x = 'Date', y = [ 'AAPL', 'JPM', 'PG', 'UAL'], linewidth = 3, figsize = (14,6), subplots=True)
```

Out[ ]:
```
array([<Axes: xlabel='Date'>, <Axes: xlabel='Date'>,
       <Axes: xlabel='Date'>, <Axes: xlabel='Date'>], dtype=object)
```



In [ ]:
```
plt.figure(figsize=(20,4))

plt.subplot(1,4,1)
plt.plot(daily_prices_df['AAPL'], 'r--')
plt.grid()

plt.subplot(1,4,2)
plt.plot(daily_prices_df['JPM'], 'b')
plt.grid()

plt.subplot(1,4,3)
plt.plot(daily_prices_df['PG'], 'g')
plt.grid()

plt.subplot(1,4,4)
plt.plot(daily_prices_df['UAL'], 'y')
plt.grid()
```



In [ ]:
```
daily_returns_df
```

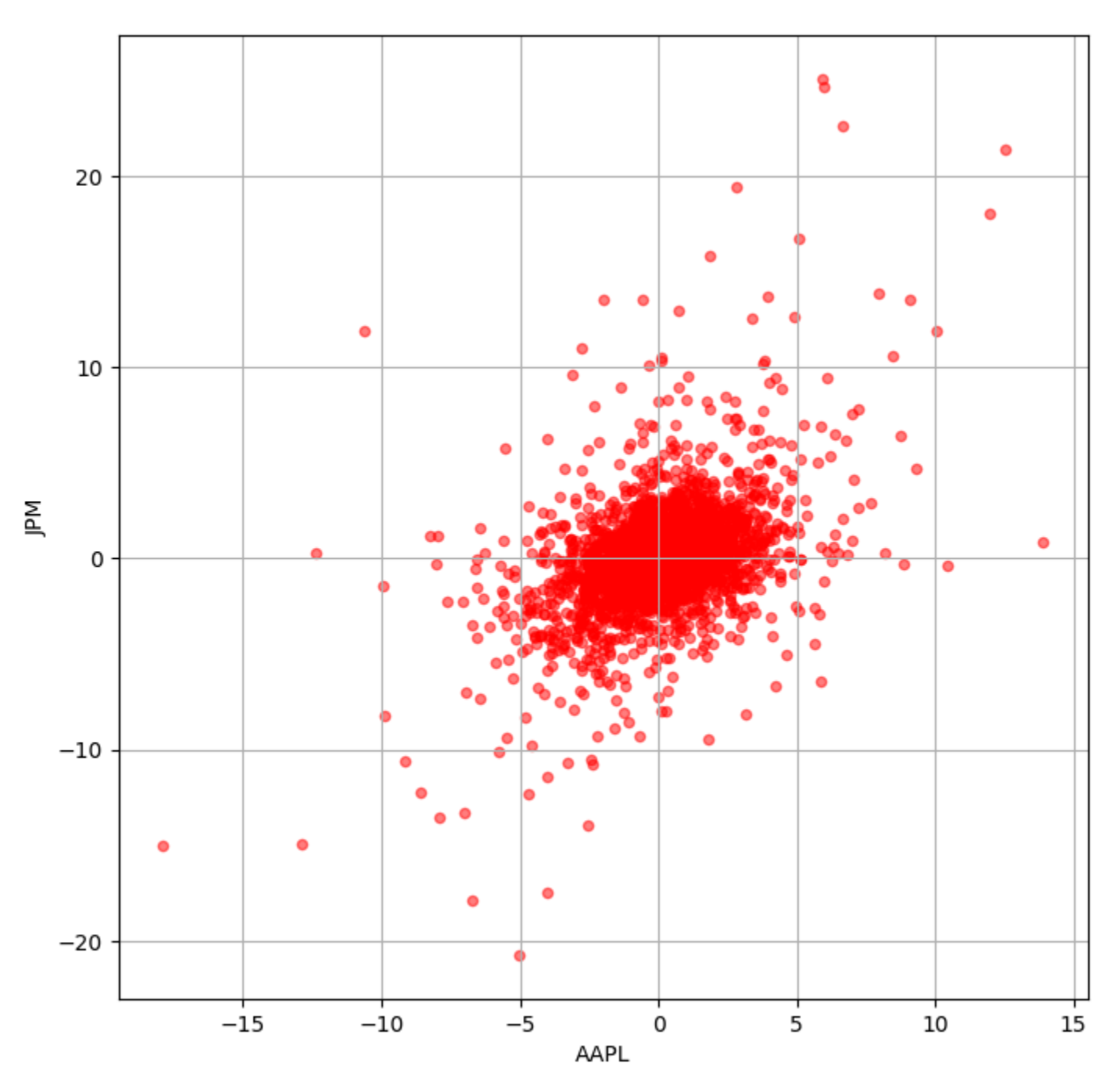
Out[ ]:

	Date	AAPL	JPM	PG	UAL
0	1/2/2008	0.000000	0.000000	0.000000	0.000000
1	1/3/2008	0.046203	-0.687708	0.000000	-0.750233
2	1/4/2008	-7.633517	-2.268378	-0.401072	4.409454
3	1/7/2008	-1.338518	1.001718	0.652615	-5.870973
4	1/8/2008	-3.597157	-3.967066	0.262103	-16.415356
...	...	...	...	...	...
3637	6/13/2022	-3.828484	-2.977838	-2.677001	-10.058308
3638	6/14/2022	0.667265	-1.663937	-3.119796	-0.081034
3639	6/15/2022	2.011147	1.183593	-0.993725	2.433084
3640	6/16/2022	-3.965145	-1.715625	0.611284	-8.207972
3641	6/17/2022	1.153314	-0.352642	-0.720077	4.312824

3642 rows × 5 columns

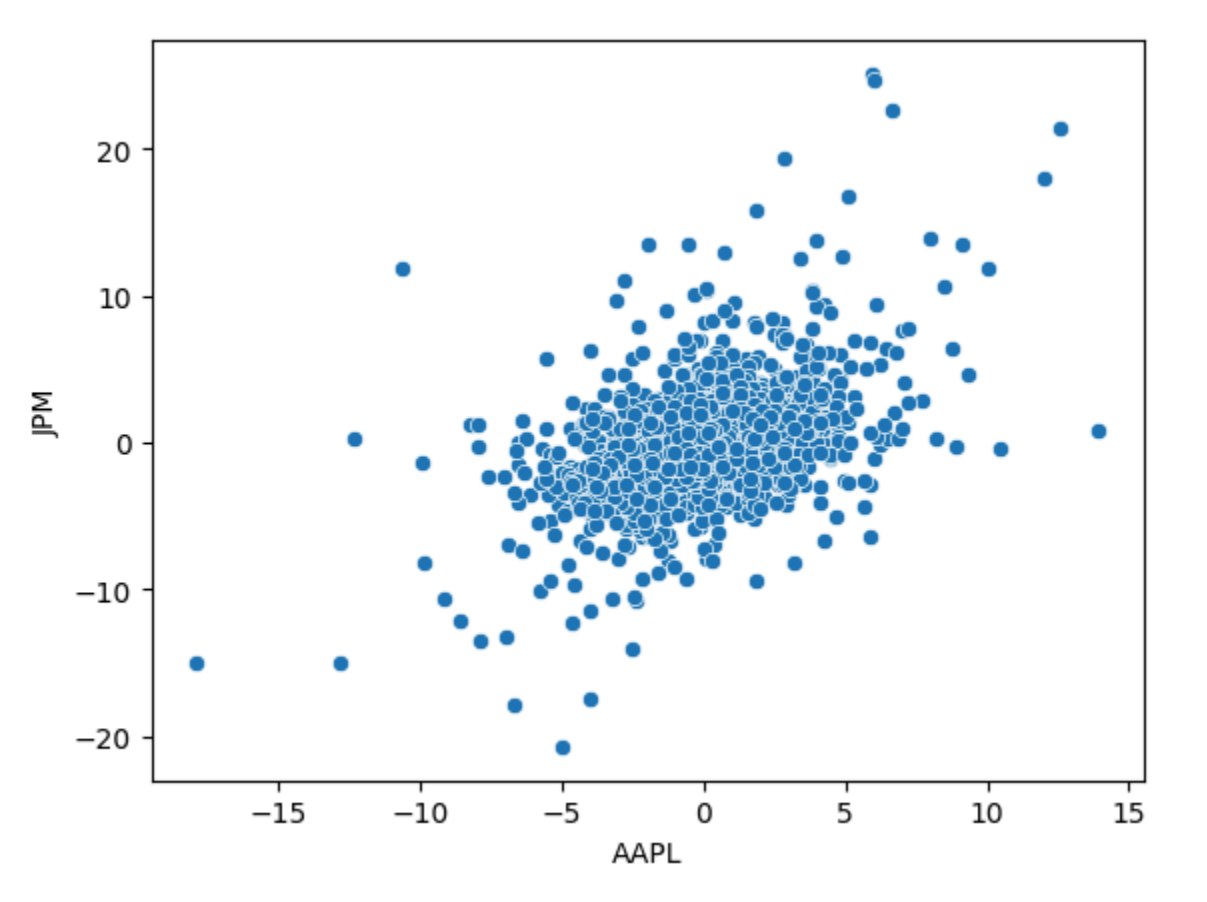
In [ ]:
```
daily_returns_df.plot.scatter('AAPL', 'JPM', grid=True, alpha=0.5, figsize=(8,8), color = 'r')
```

Out[ ]:
```
<Axes: xlabel='AAPL', ylabel='JPM'>
```



In [ ]:
```
sns.scatterplot(data=daily_returns_df, x='AAPL', y='JPM')
```

Out[ ]:
```
<Axes: xlabel='AAPL', ylabel='JPM'>
```



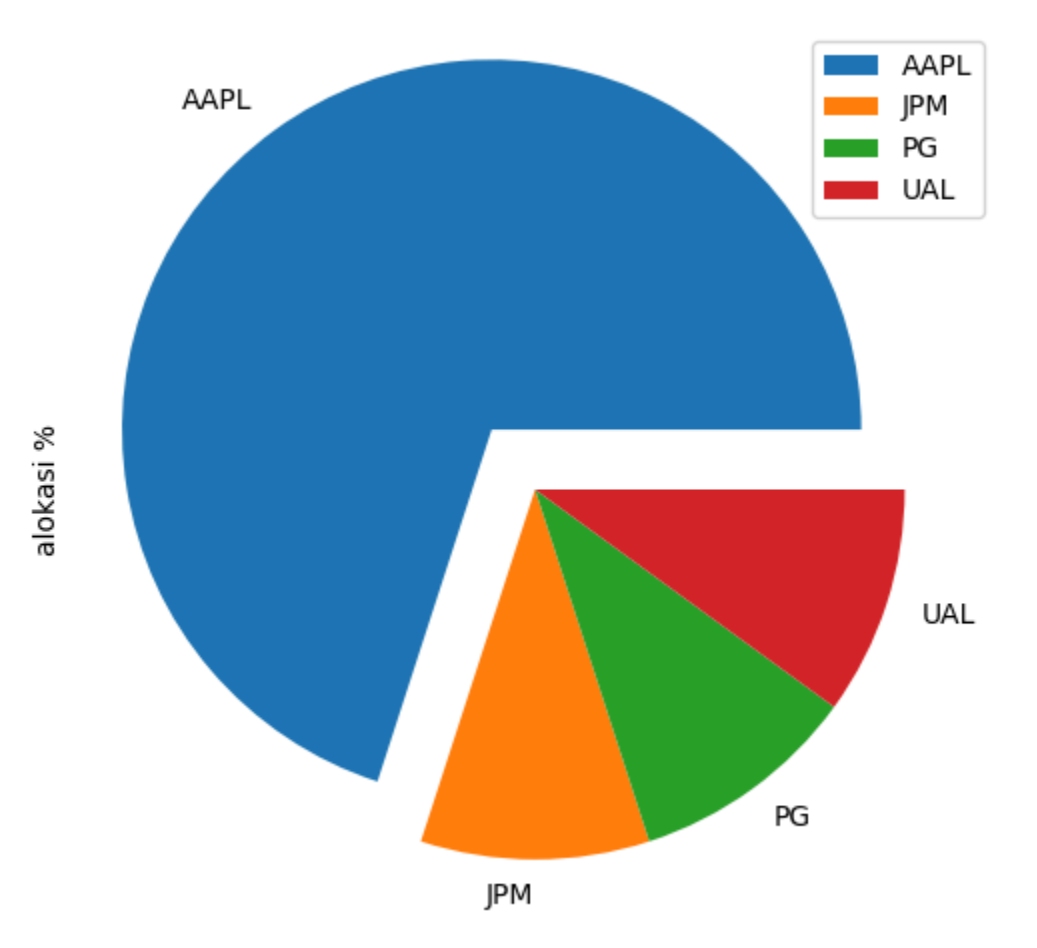
In [ ]:
```
data = {'alokasi %' : [70,10,10,10]}
index = ['AAPL','JPM','PG','UAL']
bullish_pd = pd.DataFrame(data, index)

bullish_pd
```

Out[ ]:

	alokasi %
AAPL	70
JPM	10
PG	10
UAL	10

In [ ]:
```
bullish_pd.plot.pie(y='alokasi %', explode = (0.2,0,0,0), figsize=(6,6))
```

Out[ ]:
```
<Axes: ylabel='alokasi %'>
```



In [ ]:
```
daily_returns_df
```

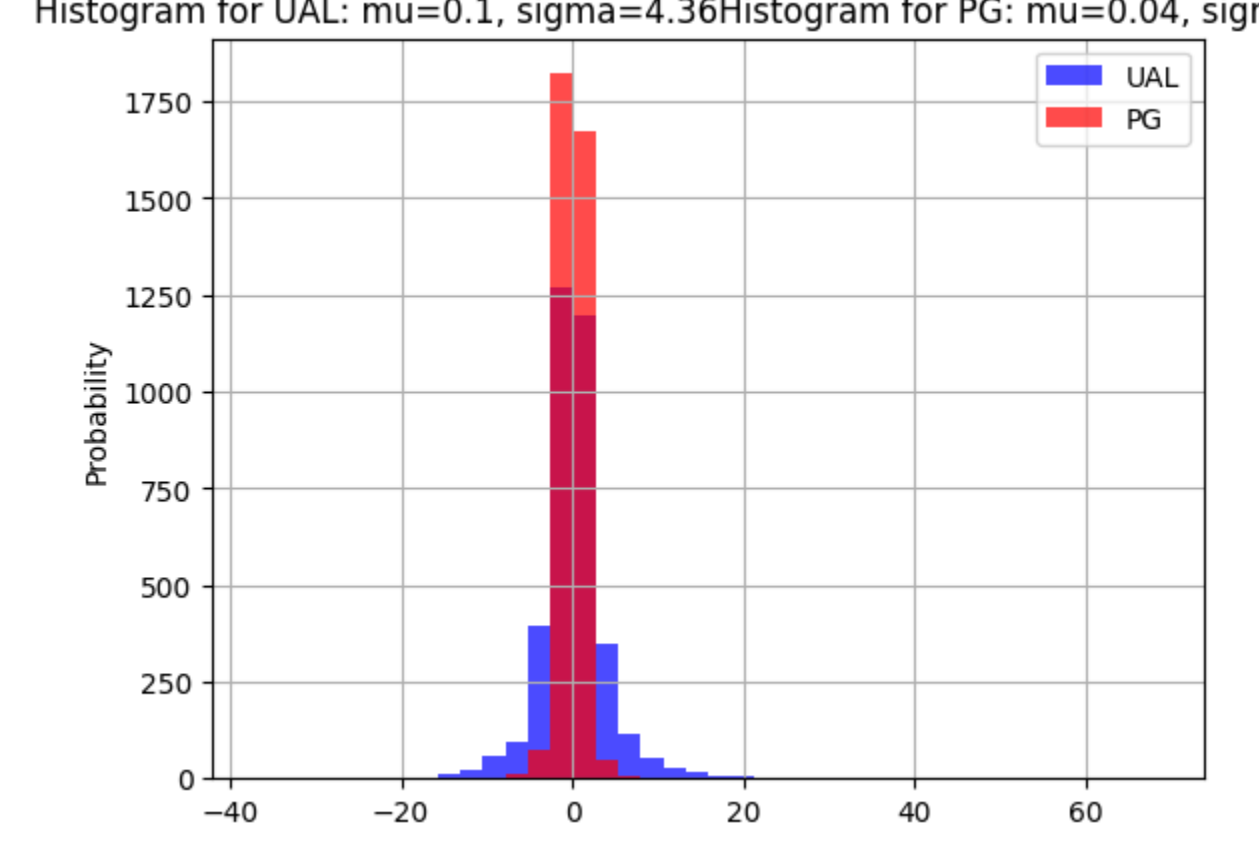
Out[ ]:

	Date	AAPL	JPM	PG	UAL
0	1/2/2008	0.000000	0.000000	0.000000	0.000000
1	1/3/2008	0.046203	-0.687708	0.000000	-0.750233
2	1/4/2008	-7.633517	-2.268378	-0.401072	4.409454
3	1/7/2008	-1.338518	1.001718	0.652615	-5.870973
4	1/8/2008	-3.597157	-3.967066	0.262103	-16.415356
...	...	...	...	...	...
3637	6/13/2022	-3.828484	-2.977838	-2.677001	-10.058308
3638	6/14/2022	0.667265	-1.663937	-3.119796	-0.081034
3639	6/15/2022	2.011147	1.183593	-0.993725	2.433084
3640	6/16/2022	-3.965145	-1.715625	0.611284	-8.207972
3641	6/17/2022	1.153314	-0.352642	-0.720077	4.312824

3642 rows × 5 columns

In [ ]:
```
mu1 = round(daily_returns_df['UAL'].mean(), 2) # mean of distribution
sigma1 = round(daily_returns_df['UAL'].std(), 2) # standard deviation of distribution

mu2 = round(daily_returns_df['PG'].mean(), 2) # mean of distribution
sigma2 = round(daily_returns_df['PG'].std(), 2) # standard deviation of distribution

num_bins = 40

plt.figure(figsize = (20, 15))

daily_returns_df[['UAL','PG']].plot.hist(bins = num_bins, color = ('b','r'), alpha = 0.7)

plt.grid()
plt.ylabel('Probability')
plt.title('Histogram for UAL: mu=' + str(mu1) + ', sigma=' + str(sigma1) + 'Histogram for PG: mu=' + str(mu2) + ', sigma=' + str(sigma2))
```

Out[ ]:
```
Text(0.5, 1.0, 'Histogram for UAL: mu=0.1, sigma=4.36Histogram for PG: mu=0.04, sigma=1.2')
<Figure size 2000x1500 with 0 Axes>
```



In [ ]:
```
daily_prices_df
```

Out[ ]:

	AAPL	JPM	PG	UAL
0	5.949703	29.448614	47.058838	29.915234
1	5.952452	29.246094	47.058838	29.690800
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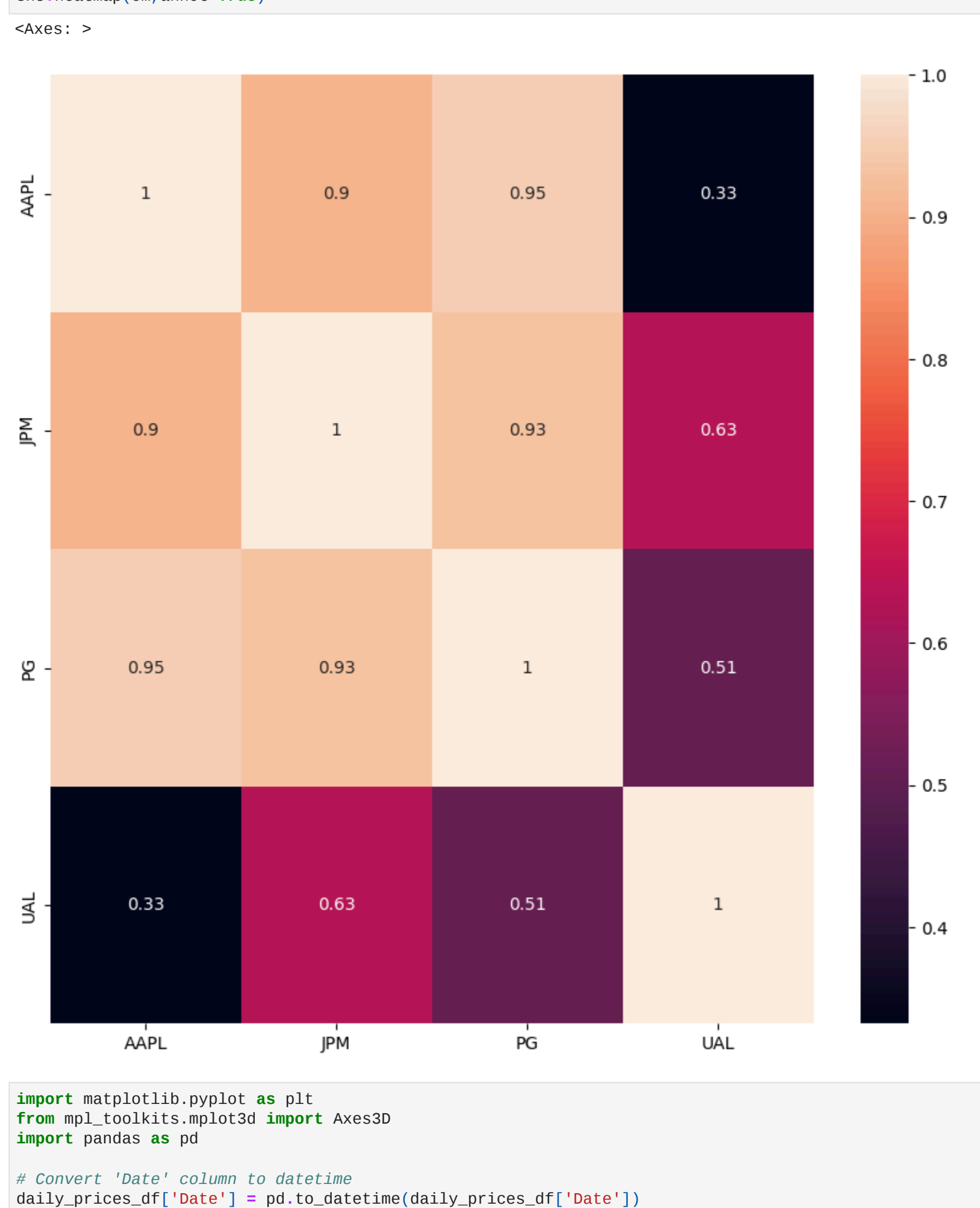
3640	130.059998	113.430000	133.320007	34.779999
3641	131.559998	113.029999	132.360001	36.279999

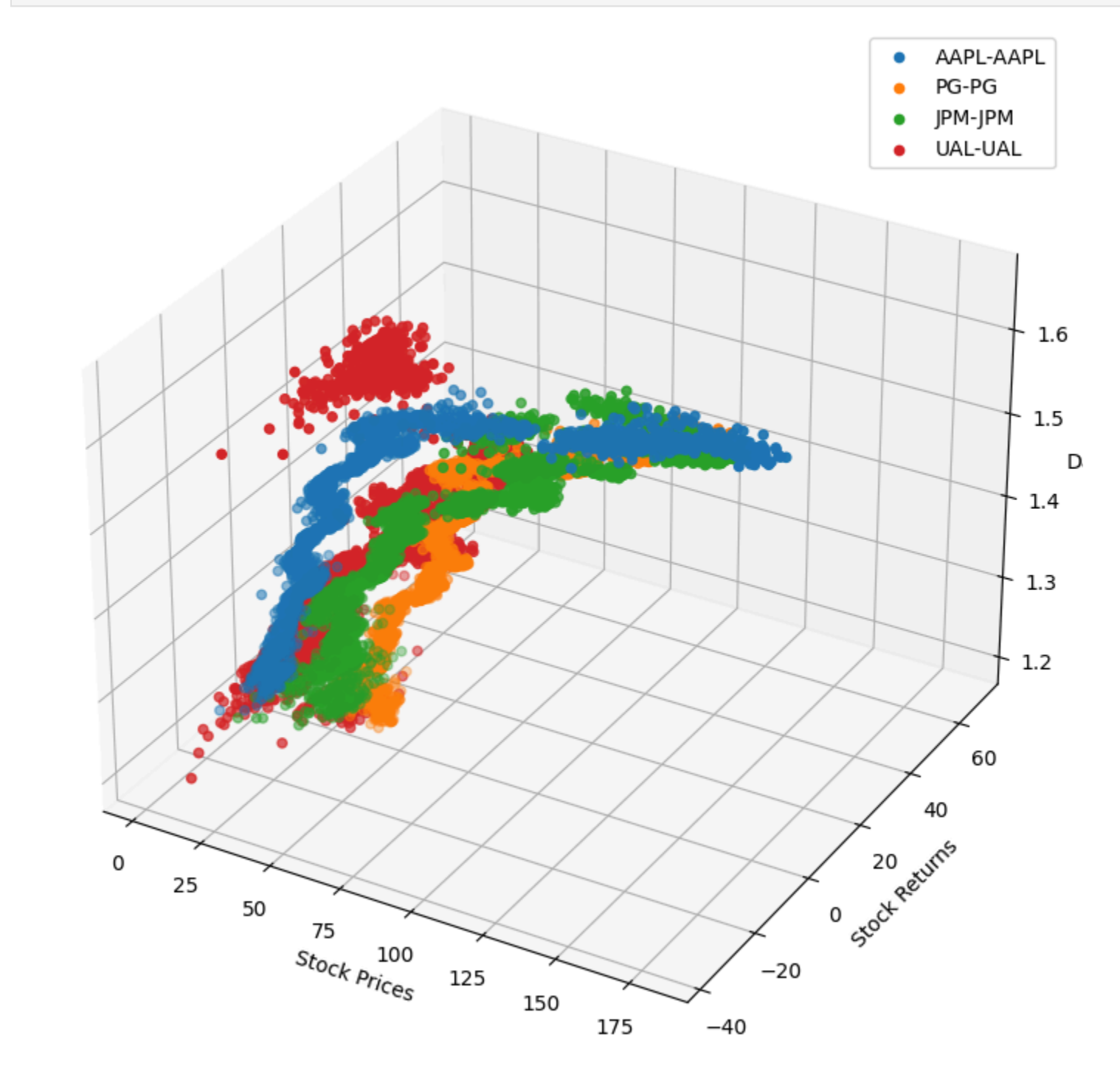
3642 rows × 4 columns

In [ ]:
```
plt.figure(figsize=(10,10))
# deletedate = daily_prices_df.drop('Date',axis='columns', inplace=True)
cm= daily_prices_df.corr()
sns.heatmap(cm,annot=True)
```

Out[ ]:
```
<Axes: >
```



In [ ]:
```
import matplotlib.pyplot as plt
from mpl_toolkits.mplot3d import Axes3D
import pandas as pd

# Convert 'Date' column to datetime
daily_prices_df['Date'] = pd.to_datetime(daily_prices_df['Date'])

fig = plt.figure(figsize=(20, 15))
ax1 = fig.add_subplot(121, projection='3d')

# Convert 'Date' to numerical representation
z = pd.to_numeric(daily_prices_df['Date'])
x_columns = ['AAPL', 'PG', 'JPM', 'UAL']
y_columns = ['AAPL', 'PG', 'JPM', 'UAL']

for x_col, y_col in zip(x_columns, y_columns):
    x = daily_prices_df[x_col].astype(float)  # Ensure data is numerical
    y = daily_returns_df[y_col].astype(float)  # Ensure data is numerical
    ax1.scatter(x, y, zs=z, label=f'{x_col}-{y_col}')

ax1.set_xlabel('Stock Prices')
ax1.set_ylabel('Stock Returns')
ax1.set_zlabel('Date')
ax1.legend()

plt.show()
```



In [ ]:
```
daily_returns_df[['AAPL', 'PG', 'JPM', 'UAL']]
```

Out[ ]:

	AAPL	PG	JPM	UAL
0	0.000000	0.000000	0.000000	0.000000
1	0.046203	0.000000	-0.687708	-0.750233
2	-7.633517	-0.401072	-2.268378	4.409454
3	-1.338518	0.652615	1.001718	-5.870973
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...	...	...	...	...
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3638	0.667265	-3.119796	-1.663937	-0.081034
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In [ ]: