In [2]:
```
import pandas as pd
import seaborn as sns
import plotly.express as px

import matplotlib.pyplot as plt
```

In [3]:
```
import plotly.io as pio
pio.renderers.default = "plotly_mimetype+notebook"
```

Matplotlib

For this excercise, we have written the following code to load the stock dataset built into plotly express.

In [4]:
```
stocks = px.data.stocks()
stocks.head()

# about stocks dataset: https://plotly.com/python-api-reference/generated/plotly.data.html
```

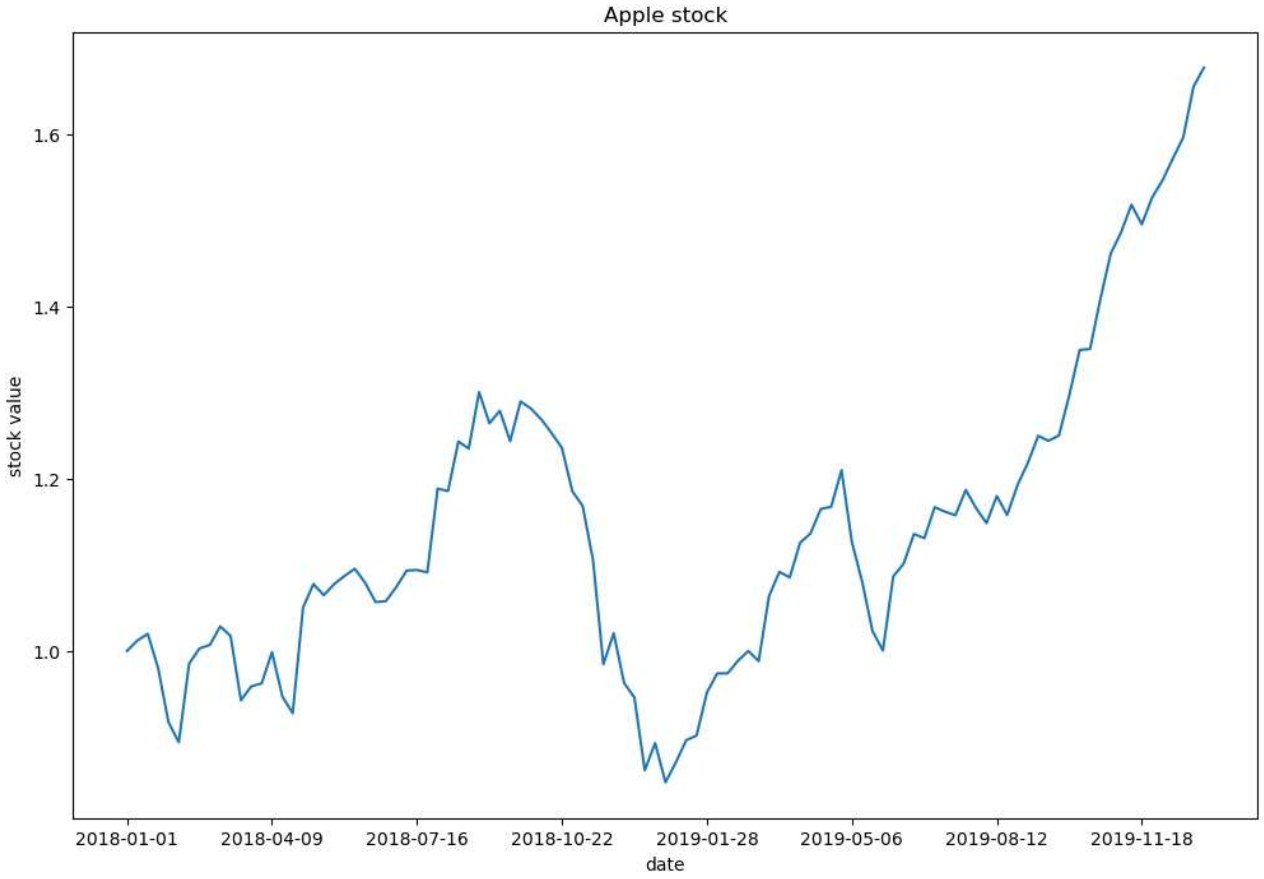
Out[4]:

	date	GOOG	AAPL	AMZN	FB	NFLX	MSFT
0	2018-01-01	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
1	2018-01-08	1.018172	1.011943	1.061881	0.959968	1.053526	1.015988
2	2018-01-15	1.032008	1.019771	1.053240	0.970243	1.049860	1.020524
3	2018-01-22	1.066783	0.980057	1.140676	1.016858	1.307681	1.066561
4	2018-01-29	1.008773	0.917143	1.163374	1.018357	1.273537	1.040708

Question 1:

Select a stock and create a suitable plot for it. Make sure the plot is readable with relevant information, such as date, values.

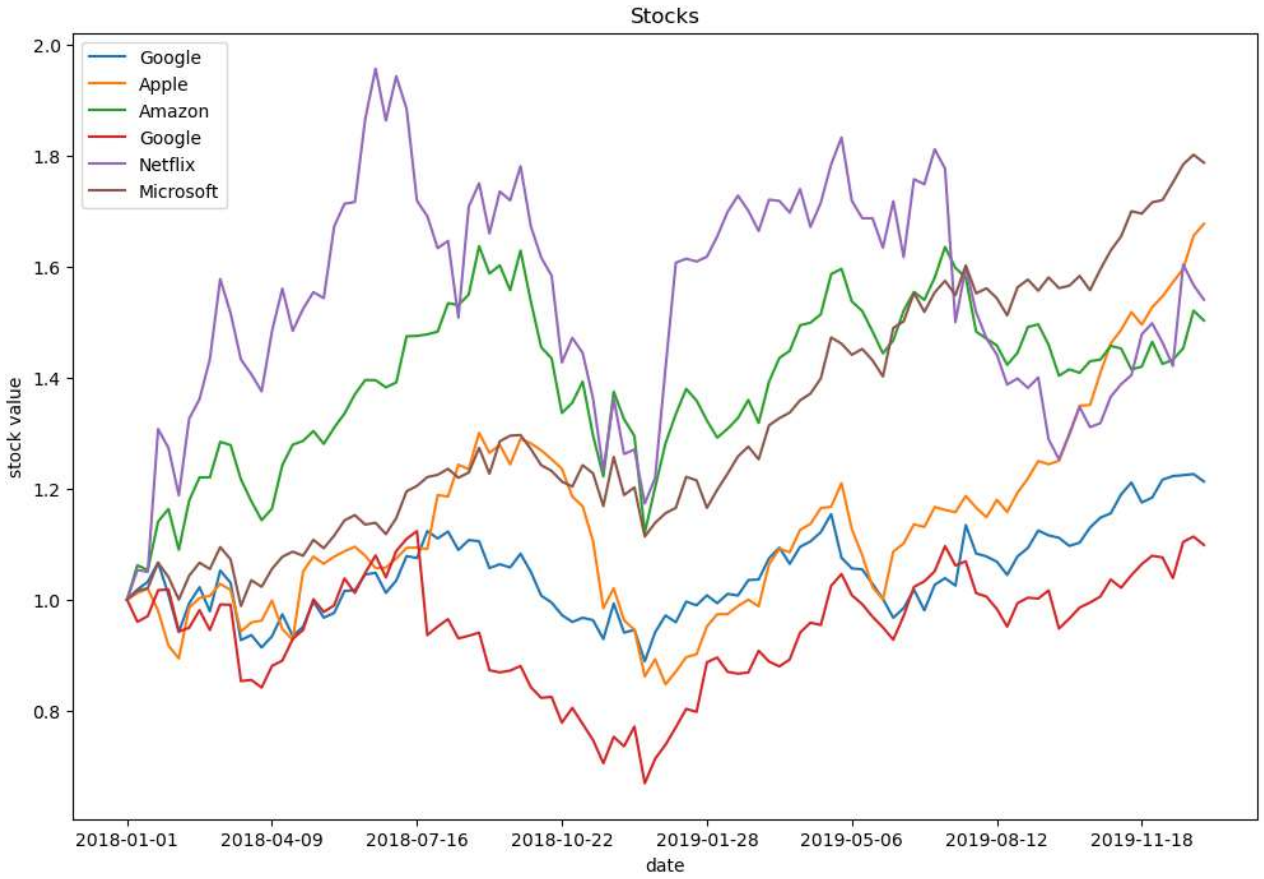
In [56]:
```
y = stocks['AAPL']
x = stocks['date']

# get figure and axes instances, set the figure size
fig, ax = plt.subplots(figsize=(12,8))

# plot
ax.plot(x, y)

# set x-axis spacing
ax.set_xticks(ax.get_xticks()[::14]) # 14 can be changed to other integers to change the intervals

# add labels
ax.set_xlabel('date')
ax.set_ylabel('stock value')

# title
ax.set_title('Apple stock')

# show the plot
plt.show()
```



Question 2:

You've already plot data from one stock. It is possible to plot multiples of them to support comparison.
To highlight different lines, customise line styles, markers, colors and include a legend to the plot.

In [59]:
```
fig, ax = plt.subplots(figsize=(12,8))

# y axis values
y1 = stocks['GOOG']
y2 = stocks['AAPL']
y3 = stocks['AMZN']
y4 = stocks['FB']
y5 = stocks['NFLX']
y6 = stocks['MSFT']

# plot
ax.plot(x, y1, label = 'Google')
ax.plot(x, y2, label = 'Apple')
ax.plot(x, y3, label = 'Amazon')
ax.plot(x, y4, label = 'Google')
ax.plot(x, y5, label = 'Netflix')
ax.plot(x, y6, label = 'Microsoft')

# set x-axis spacing
ax.set_xticks(ax.get_xticks()[::14]) # 14 can be changed to other integers to change the intervals

# add labels
ax.set_xlabel('date')
ax.set_ylabel('stock value')

# add legend
ax.legend()

# title
ax.set_title('Stocks')

plt.show()
```



Seaborn

First, load the tips (https://github.com/mwaskom/seaborn-data/blob/master/tips.csv) dataset

In [5]:
```
tips = sns.load_dataset('tips')
tips.head()
```

Out[5]:

	total_bill	tip	sex	smoker	day	time	size
0	16.99	1.01	Female	No	Sun	Dinner	2
1	10.34	1.66	Male	No	Sun	Dinner	3
2	21.01	3.50	Male	No	Sun	Dinner	3
3	23.68	3.31	Male	No	Sun	Dinner	2
4	24.59	3.61	Female	No	Sun	Dinner	4

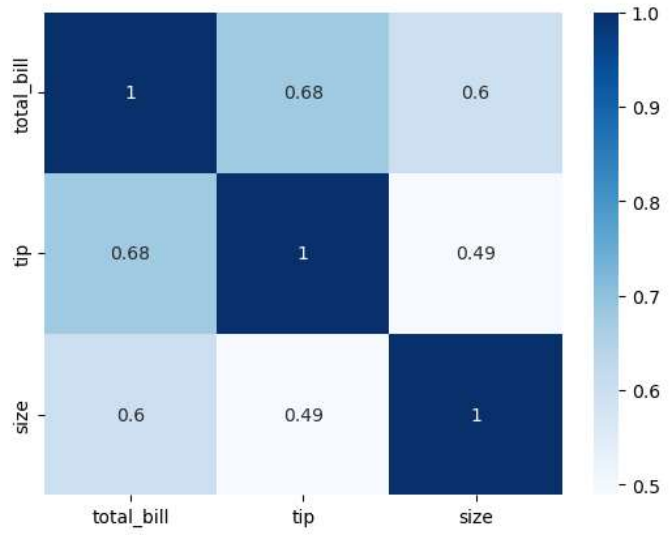
Question 3:

Let's explore this dataset. Pose a question and create a plot that support drawing answers for your question.

- What attribute correlate the most with tip?

In [6]:
```
# get the correlation matrix
corr_matrix = tips.corr()

# plot it using seaborn
sns.heatmap(corr_matrix, annot = True, cmap = 'Blues')
```

Out[6]: <AxesSubplot:>



- **total_bill** and **tip** correlate the most.

Plotly Express

Question 4:

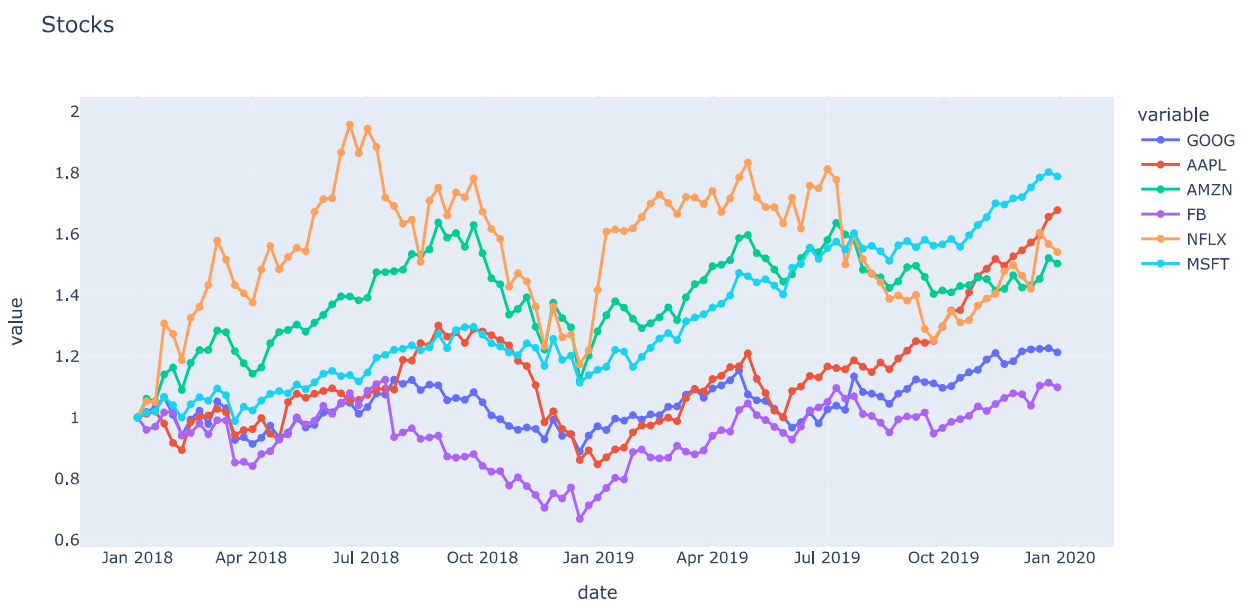
Redo the above exercises (challenges 2 & 3) with plotly express. Create diagrams which you can interact with.

The stocks dataset

Hints:

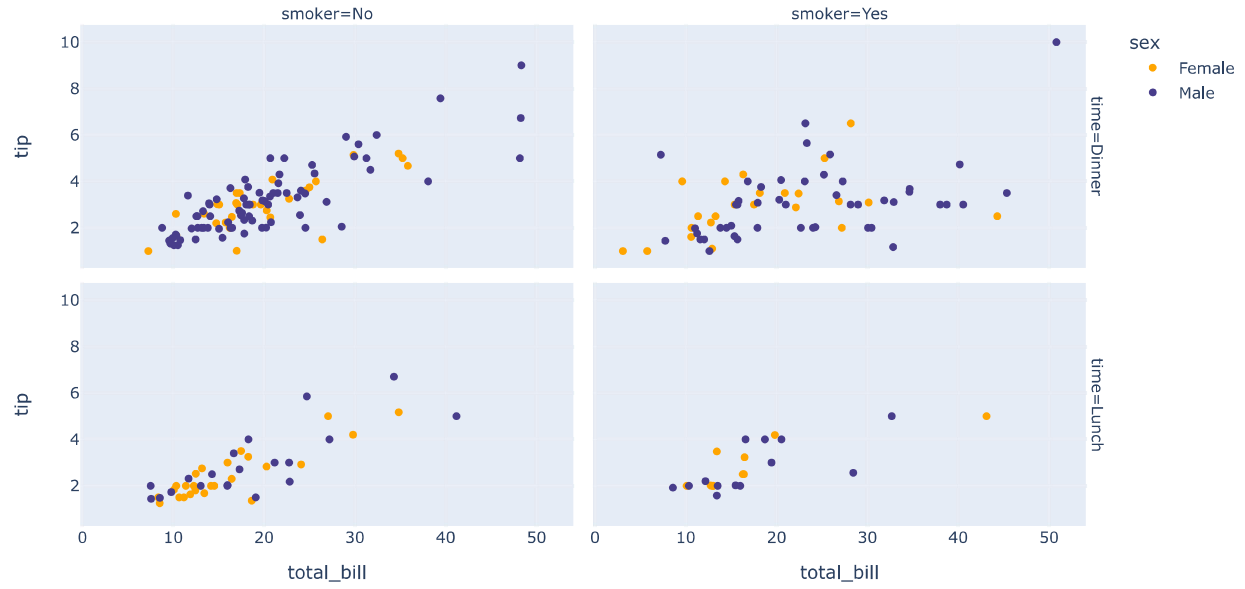
- Turn stocks dataframe into a structure that can be picked up easily with plotly express

In [7]:
```
fig = px.line(stocks, x="date", y=['GOOG', 'AAPL', 'AMZN', 'FB', 'NFLX', 'MSFT'],
              markers=True, title='Stocks')
fig.show()

# can also do:
# import plotly.graph_objects as go
# fig = go.Figure()
# fig.add_trace(go.Scatter(x=stocks['date'], y=stocks['GOOG'],
#                          mode='lines+markers',
#                          name='Google'))
# fig.add_trace(go.Scatter(x=stocks['date'], y=stocks['AAPL'],
#                          mode='lines+markers',
#                          name='Apple'))
# ...
```



The tips dataset

In [8]:
```
fig = px.scatter(tips, x="total_bill", y="tip", color="sex", facet_col="smoker", facet_row="time", color_discrete_sequence=['orange', 'darksla
fig.show()

# CSS color values: https://www.w3.org/wiki/CSS/Properties/color/keywords
```



Question 5:

Recreate the barplot below that shows the population of different continents for the year 2007.

Hints:

- Extract the 2007 year data from the dataframe. You have to process the data accordingly
- use plotly bar (https://plotly.com/python-api-reference/generated/plotly.express.bar)
- Add different colors for different continents
- Sort the order of the continent for the visualisation. Use axis layout setting (https://plotly.com/python/reference/layout/xaxis/)
- Add text to each bar that represents the population

In [9]:
```
#load data
df = px.data.gapminder()
df.head()
```

Out[9]:

	country	continent	year	lifeExp	pop	gdpPercap	iso_alpha	iso_num
0	Afghanistan	Asia	1952	28.801	8425333	779.445314	AFG	4
1	Afghanistan	Asia	1957	30.332	9240934	820.853030	AFG	4
2	Afghanistan	Asia	1962	31.997	10267083	853.100710	AFG	4
3	Afghanistan	Asia	1967	34.020	11537966	836.197138	AFG	4
4	Afghanistan	Asia	1972	36.088	13079460	739.981106	AFG	4

In [10]:
```
# extract the 2007 year data
# df_2007 = df.query('year==2007')
# fig = px.bar(df_2007, x="pop", y="continent", orientation='h', color="continent", text="pop").update_xaxes(categoryorder="category descendin
# fig.update_layout(barmode='stack', xaxis={'categoryorder': 'total descending'})
# fig.show()
def get_pop_sum(df, cname):
    '''
    df: dataframe
    cname: str, indicating the name of the continent, i.e. `Asia`, 'Europe'
    return: a numerical number, indicating the population of this continent
    '''
    df_2007   = df.query('year==2007') # extract 2007 year data
    df_cname  = df_2007.query('continent==@cname') # use variable in the query expression, use '@' as prefix
    sum_cname = df_cname['pop'].sum()
    return sum_cname

# get names of all continents
cnames = df['continent'].unique()

# store the pop number of each continent in a list
pop_list = []
for cname in cnames:
    sum = get_pop_sum(df, cname)
    pop_list.append(sum)

# use cnames and pop_list to create a new dataframe - for plotting
df_plot = pd.DataFrame(cnames, columns=['continent'])
df_plot = pd.concat([df_plot, pd.DataFrame(pop_list, columns=['pop'])], axis=1)

# plot
fig = px.bar(df_plot, x='pop', y='continent', orientation='h', color="continent", text_auto='.2s')
fig.update_traces(textposition="outside") # set the position of texts
fig.update_layout(barmode='stack', yaxis={'categoryorder': 'total ascending'}) # sort the bar chart according to numeric values
fig.show()

# can also do
# import plotly.graph_objects as go
# fig = go.Figure(go.Bar(x=pop_list, y=cnames, orientation='h'))
# fig.update_layout(barmode='stack', yaxis={'categoryorder': 'total descending'}) # use yaxis
# fig.show()
```