PROCEDURES

9.4 Introduction to Seaborn - github link

9.5 Formatting Plots - github link

9.6 Customizing Visualizations - github link

SUPPLEMENTARY ACTIVITIES

```
1 import pandas as pd
2 import numpy as np
3 import seaborn as sns
4 import matplotlib.pyplot as plt
5
6 quakes = pd.read_csv('/content/earthquakes-1.csv')
7 fb = pd.read_csv('/content/fb_stock_prices_2018.csv')
```

```
1 quakes
```

	mag	magType	time	place	tsunami	parsed_place
0	1.35	ml	1539475168010	9km NE of Aguanga, CA	0	California
1	1.29	ml	1539475129610	9km NE of Aguanga, CA	0	California
2	3.42	ml	1539475062610	8km NE of Aguanga, CA	0	California
3	0.44	ml	1539474978070	9km NE of Aguanga, CA	0	California
4	2.16	md	1539474716050	10km NW of Avenal, CA	0	California
...	...	...	...	...	...	...
9327	0.62	md	1537230228060	9km ENE of Mammoth Lakes, CA	0	California
9328	1.00	ml	1537230135130	3km W of Julian, CA	0	California
9329	2.40	md	1537229908180	35km NNE of Hatillo, Puerto Rico	0	Puerto Rico
9330	1.10	ml	1537229545350	9km NE of Aguanga, CA	0	California
9331	0.66	ml	1537228864470	9km NE of Aguanga, CA	0	California

9332 rows × 6 columns

Next steps: View recommended plots

```
1 fb
```

	date	open	high	low	close	volume
0	2018-01-02	177.68	181.58	177.5500	181.42	18151903
1	2018-01-03	181.88	184.78	181.3300	184.67	16886563
2	2018-01-04	184.90	186.21	184.0996	184.33	13880896
3	2018-01-05	185.59	186.90	184.9300	186.85	13574535
4	2018-01-08	187.20	188.90	186.3300	188.28	17994726
...	...	...	...	...	...	...
246	2018-12-24	123.10	129.74	123.0200	124.06	22066002
247	2018-12-26	126.00	134.24	125.8900	134.18	39723370
248	2018-12-27	132.44	134.99	129.6700	134.52	31202509
249	2018-12-28	135.34	135.92	132.2000	133.20	22627569
250	2018-12-31	134.45	134.64	129.9500	131.09	24625308

251 rows × 6 columns

Next steps: View recommended plots

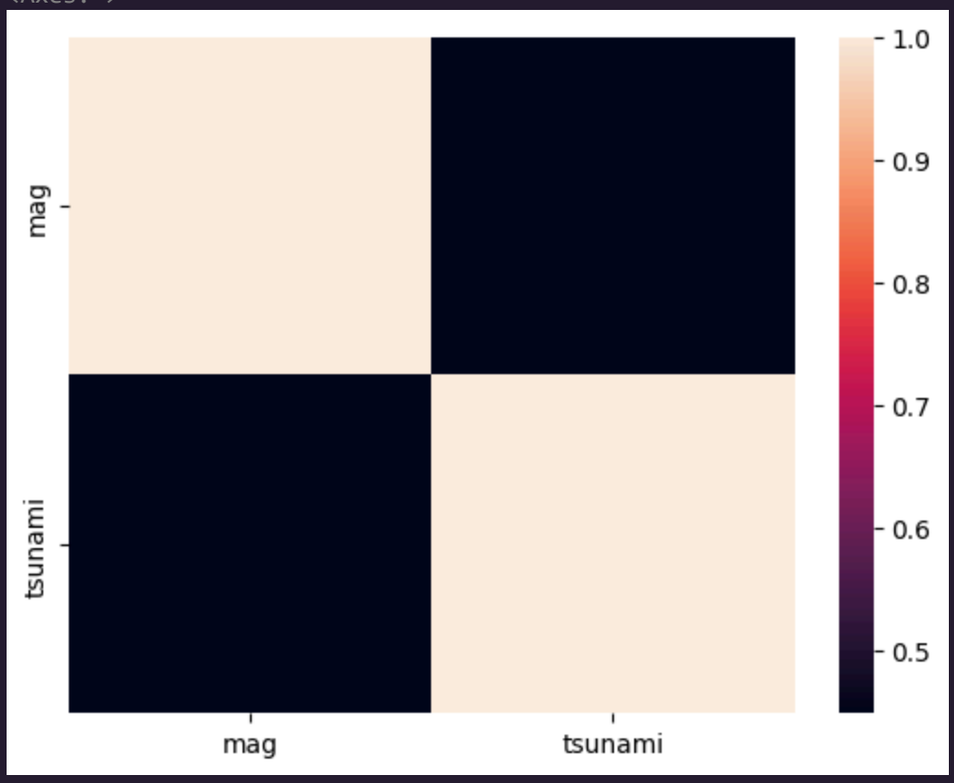
```
1 fb.dtypes
```

```
date       object
open      float64
high      float64
low       float64
close     float64
volume      int64
dtype: object
```

Using seaborn, create a heatmap to visualize the correlation coefficients between earthquake magnitude and whether there was a tsunami with the magType of mb.

```
1 qkf = quakes.query('magType == "mb"')[['mag','tsunami']]
2 corqkf = qkf.corr()
3 sns.heatmap(corqkf)
```

<Axes: >

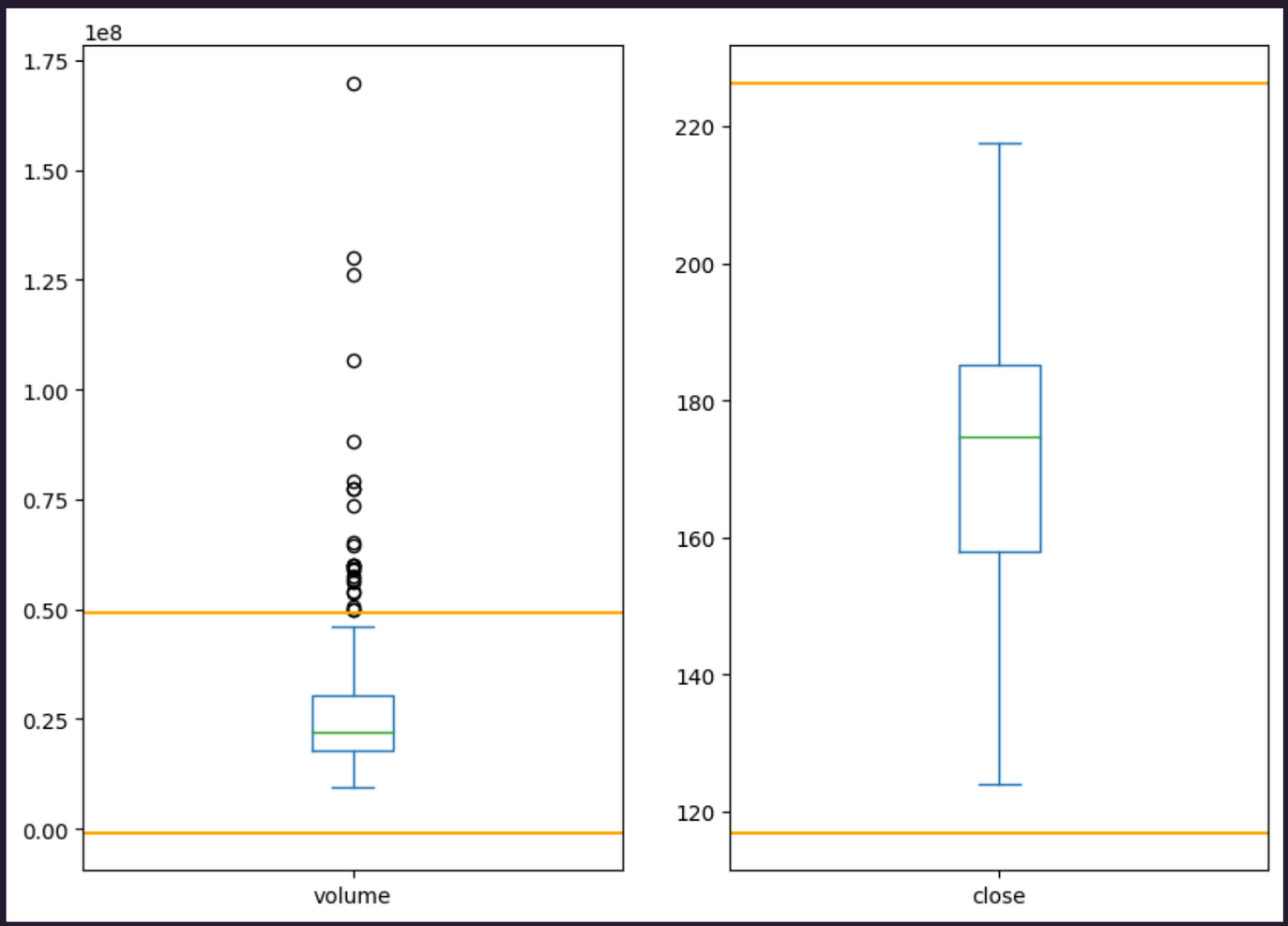


Create a box plot of Facebook volume traded and closing prices, and draw reference lines for the bounds of a Tukey fence with a multiplier of 1.5. The bounds will be at Q1 - 1.5 * IQR and Q3 + 1.5 * IQR. Be sure to use the quantile() method on the data to make this easier. (Pick whichever orientation you prefer for the plot, but make sure to use subplots.)

```
colm = ['volume','close']
subset = fb[colm]
qtiles = subset.quantile([0.25,0.75])
qtiles.loc['iqr',:] = qtiles.loc[0.75,:]-qtiles.loc[0.25,:]

axs = subset.plot(kind='box', subplots=True, figsize=(10,7))

for ax, col in zip(axs, colm):
  stats = qtiles[col]
  u = stats.loc[0.25]- 1.5 * stats['iqr']
  l = stats.loc[0.75]+ 1.5 * stats['iqr']
  for bound, name in zip([l,u],['lower','upper']):
    ax.axhline(bound, color='orange')
```

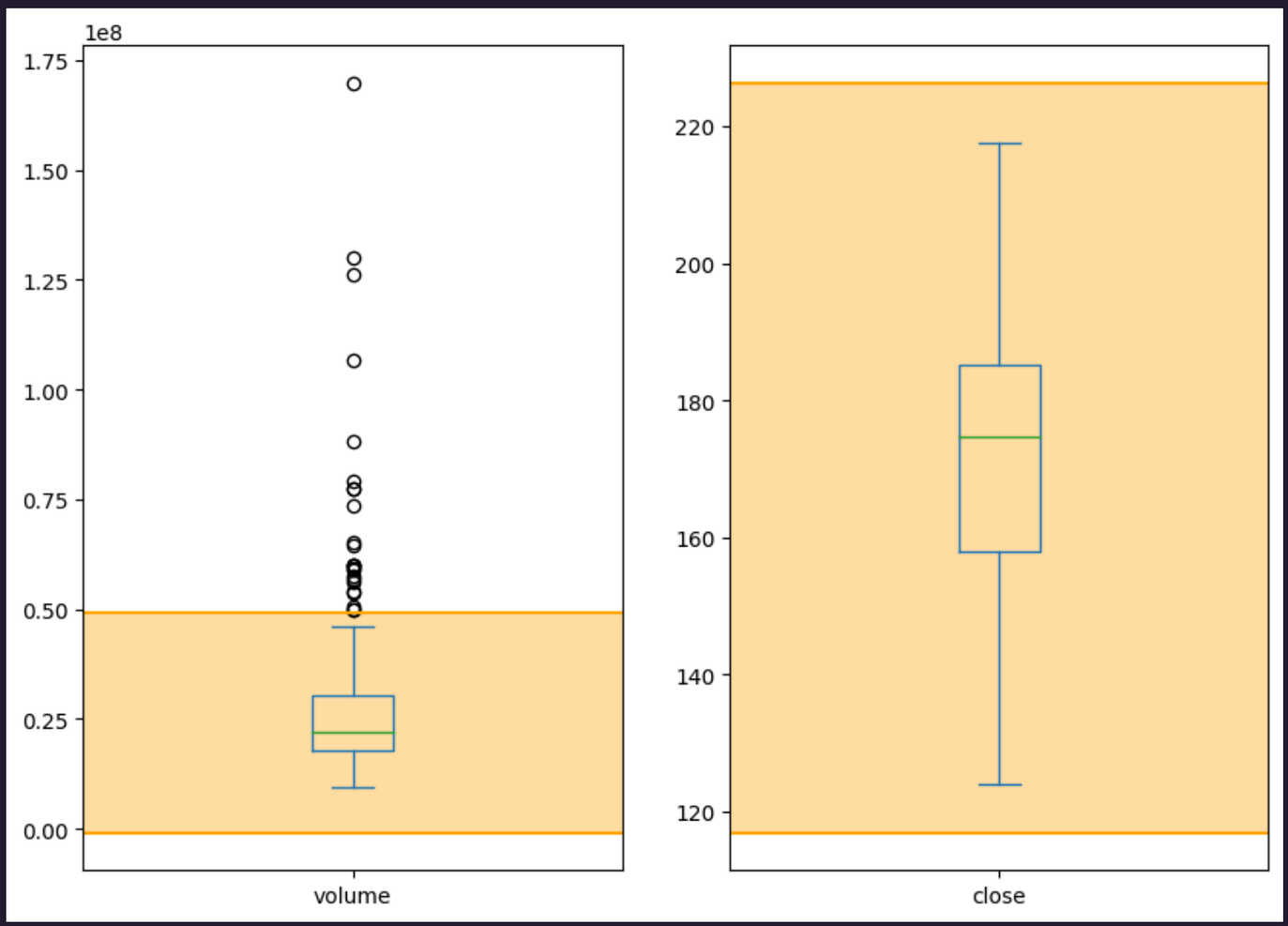


Fill in the area between the bounds in the plot from exercise #2

```
colm = ['volume','close']
subset = fb[colm]
qtiles = subset.quantile([0.25,0.75])
qtiles.loc['iqr',:] = qtiles.loc[0.75,:]-qtiles.loc[0.25,:]

axs = subset.plot(kind='box', subplots=True, figsize=(10,7))

for ax, col in zip(axs, colm):
  stats = qtiles[col]
  u = stats.loc[0.25]- 1.5 * stats['iqr']
  l = stats.loc[0.75]+ 1.5 * stats['iqr']
  for bound, name in zip([l,u],['lower','upper']):
    ax.axhline(bound, color='orange')
    ax.axhspan(l,u,facecolor='orange',alpha=0.2)
```



Use axvspan() to shade a rectangle from '2018-07-25' to '2018-07-31', which marks the large decline in Facebook price on a line plot of the closing price.

```
fb['date'] = pd.to_datetime(fb['date'])
fb.set_index('date', inplace=True)

plt.plot(fb['close'])

plt.axvspan('2018-07-25', '2018-07-31', alpha=0.4, color='red', label='Large Decline')

plt.xlabel('Date')
plt.ylabel('Closing Price')
plt.title('Facebook Closing Price')
plt.legend()

plt.show()
```

Using the Facebook stock price data, annotate the following three events on a line plot of the closing price:

- Disappointing user growth announced after close on July 25, 2018
- Cambridge Analytica story breaks on March 19, 2018 (when it affected the market)
- FTC launches investigation on March 20, 2018

```
fb_close = fb.plot(kind='line', y='close',
                   figsize=(17,5), title='fb closing price',
                   ylabel='price')

dates = ['2018-07-25', '2018-03-19', '2018-03-28']
events = ['Disappointing user growth', 'cambridge analytica story', 'FTC launches investigation']

valid_dates = [date for date in dates if date in fb.index]

if len(valid_dates) != len(dates):
  print(f"Warning: Not all dates found in dataframe. Using only valid dates: {valid_dates}")

prices = []
for date in valid_dates:
    prices.append(fb.loc[date, 'close'])

for (date, price, name) in zip(valid_dates, prices, events):

    fb_close.annotate(name, xy=(date, price),
                                xytext=(50,0),
                                textcoords="offset points",
                                arrowprops=dict(facecolor="green"))
```

Modify the reg_resid_plots() function to use a matplotlib colormap instead of cycling between two colors. Remember, for this use case, we should pick a qualitative colormap or make our own.

```
all_cmaps = plt.colormaps()
qualitative_cmaps = [cmap for cmap in all_cmaps if cmap.startswith('tab') or cmap.startswith('Set') or cm

print(qualitative_cmaps)
```

```
['Pastel1', 'Pastel2', 'Set1', 'Set2', 'Set3', 'tab10', 'tab20', 'tab20b', 'tab20c', 'Pastel1_r',
```

```
import itertools
import random

import matplotlib.pyplot as plt
import matplotlib.cm as cm
import seaborn as sns


def reg_resid_plots(data):
    """
    Using seaborn, plot the regression and residuals
    plots side-by-side for every permutation of 2 columns
    in the data, using a randomly chosen matplotlib colormap.

    Parameters:
        - data: A pandas DataFrame

    Returns:
        A matplotlib Figure object.
    """
    num_cols = data.shape[1]
    permutation_count = num_cols * (num_cols - 1)

    fig, ax = plt.subplots(permutation_count, 2, figsize=(15, 8))

    # Get a list of all registered colormaps
    ql_cmaps = qualitative_cmaps

    for (x, y), axes in zip(
        itertools.permutations(data.columns, 2),
        ax,
    ):
        # Randomly choose a colormap name
        cmap_name = random.choice(ql_cmaps)

        for subplot, func in zip(axes, (sns.regplot, sns.residplot)):
            func(x=x, y=y, data=data, ax=subplot, color=cm.get_cmap(cmap_name)(0.5))  # Use color at cen

```

```
    plt.close()
    return fig
```

```
# 4 testing (from 9.4)

fb_reg_data = fb.assign(
 volume=np.log(fb.volume),
 max_abs_change=fb.high - fb.low
).iloc[:,-2:]
```