# Python Code

## Question 2

**Graph 3**

```
import pandas as pd
import matplotlib.pyplot as plt
import matplotlib.dates as mdates

# Import the Data
file_path = '/Users/lachezar/Documents/BG.xlsx'
df = pd.read_excel(file_path, index_col='Date')

# Plot the Gpaph
fig, ax = plt.subplots(figsize=(10, 6))
ax.plot(df.index, df, label='BG Group Stock Price', color='purple')

# Add Two Lines
ax.axhline(y=1367, color='orange', label='Offered Price')
plt.axvline(x=['2015-04-08'], color='green', linestyle='--', label='Time of Announcement')

# Customised Short Month Notation
ax.xaxis.set_major_locator(mdates.MonthLocator(bymonthday=1))
ax.xaxis.set_major_formatter(mdates.DateFormatter('%b'))

# labels and Title
plt.xlabel('Figure 3')
plt.ylabel('Price')
plt.title('BG Group Stock Price (08.04.2015 - 15.02.2016)')
plt.legend()
plt.grid(True)
plt.show()
```

**Graph 4, Means, and Standard Deviations**

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import matplotlib.dates as mdates

# Import the Data for BG Group and FTSE 100
file_path = '/Users/lachezar/Documents/BG.xlsx'
df = pd.read_excel(file_path, index_col='Date')

file_path_index = '/Users/lachezar/Documents/FTSE.xlsx'
dd = pd.read_excel(file_path_index, index_col='Date')

# Functions for Cumulative Returns
def calculate_cumulative_returns(x):
    cumulative_returns = np.cumsum(x)
    return cumulative_returns

def calculate_cumulative_returns_index(y):
    cumulative_returns_index = np.cumsum(y)
    return cumulative_returns_index


# Returns, Mean, and Standard Deviation
returns = df.pct_change()
returns_mean = returns.mean()
returns_std = returns.std()
print(f'BG Group Expected Return ={returns_mean}')
print(f'BG Group Standard Deviation ={returns_std}')

returns_index = dd.pct_change()
returns_index_mean = returns_index.mean()
returns_index_std = returns_index.std()
print(f'FTSE 100 Expected Returns={returns_index_mean}')
print(f'FTSE 100 Standard Deviation={returns_index_std}')

# Calling the Functions
final_cum_returns = calculate_cumulative_returns(returns)
final_cum_returns_ftse = calculate_cumulative_returns_index(returns_index)

# Plot the Graph
fig, ax = plt.subplots(figsize=(10, 6))
ax.plot(final_cum_returns.index, final_cum_returns, label='Cumulative Returns BG Group',
color='purple')
ax.plot(final_cum_returns_ftse.index, final_cum_returns_ftse, label='Cumulative Returns
FTSE 100', color='orange')
ax.axhline(y=0, color='red', linestyle='--')
```

```
# Customised Months on the Graph
ax.xaxis.set_major_locator(mdates.MonthLocator(bymonthday=1))
ax.xaxis.set_major_formatter(mdates.DateFormatter('%b'))

# Lables and Title
plt.xlabel('Figure 4')
plt.ylabel('Returns')
plt.title('BG Group & FTSE 100 Cumulative Returns (08.05.2015 - 15.02.2016)')
plt.legend()
plt.grid(True)
plt.show()
```