```
In [1]: import numpy as np
        import pandas as pd
        from pandas_datareader import data as wb
```

```
In [2]: tickers = ['GOOG', '^GSPC']
        data = pd.DataFrame()
        for t in tickers:
            data[t] = wb.DataReader(t, data_source='yahoo', start='2016-12-31', end='2019
        -08-02')['Adj Close']
```

```
In [3]: sec_returns = np.log(data / data.shift(1))
```

```
In [4]: cov = sec_returns.cov() * 250
        cov
```

Out[4]:

	GOOG	^GSPC
GOOG	0.056498	0.021932
^GSPC	0.021932	0.016216

```
In [5]: cov_with_market = cov.iloc[0,1]
        cov_with_market
```

Out[5]: 0.02193182708952652

```
In [6]: market_var = sec_returns['^GSPC'].var()*250
        market_var
```

Out[6]: 0.01621612387008202

```
In [7]: # Calculate Beta
        GOOG_beta = cov_with_market / market_var
        GOOG_beta
```

Out[7]: 1.35247037240445

```
In [8]: #Calculate the expected return of GOOG (CAPM)
        # 10 year US bond yield is 3% average S&P 5.5%

        GOOG_ern = 0.03 + GOOG_beta * 0.055
        GOOG_ern
```

Out[8]: 0.10438587048224475

Sharpe Ratio

```
In [9]: Sharpe = (GOOG_ern -0.025) / (sec_returns['GOOG'].std() *250 ** 0.5)
```

```
In [10]: Sharpe
```

Out[10]: 0.33398422090636626

```
In [ ]:
```