Tide Table for Cape Lookout

In [1]:

```
# Imports
import requests as req
import datetime
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
```

In [2]:

```
# Get today's date
today = datetime.date.today()
query_date = str(today).replace('-', '')
```

In [3]:

```
# Get the data
url = "https://tidesandcurrents.noaa.gov/api/datagetter?begin_date={}&end_date={}&station=8656841&product=predictions&datum=MLLW&time_zone=lst&units=english&format=json".format(query_date, query_date)
noaa_response = req.get(url)  # Response object
data = noaa_response.json()  # To json

for prediction in data['predictions'][0:10]:
    print(prediction)
```

```
{'t': '2019-09-02 00:00', 'v': '2.095'}
{'t': '2019-09-02 00:06', 'v': '1.968'}
{'t': '2019-09-02 00:12', 'v': '1.841'}
{'t': '2019-09-02 00:18', 'v': '1.714'}
{'t': '2019-09-02 00:24', 'v': '1.588'}
{'t': '2019-09-02 00:30', 'v': '1.463'}
{'t': '2019-09-02 00:36', 'v': '1.339'}
{'t': '2019-09-02 00:42', 'v': '1.218'}
{'t': '2019-09-02 00:48', 'v': '1.098'}
{'t': '2019-09-02 00:54', 'v': '0.981'}
```

In [4]:

```
# Create Pandas DataFrame
tide_predictions = pd.DataFrame.from_dict(data['predictions'])
tide_predictions.head()
```

Out[4]:

	t	v
0	2019-09-02 00:00	2.095
1	2019-09-02 00:06	1.968
2	2019-09-02 00:12	1.841
3	2019-09-02 00:18	1.714
4	2019-09-02 00:24	1.588

In [5]:

```
tide_predictions.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 240 entries, 0 to 239
Data columns (total 2 columns):
t    240 non-null object
v    240 non-null object
dtypes: object(2)
memory usage: 3.8+ KB
```

In [6]:

```
# Rename columns and change data types
tide_predictions.columns = ['Hour', 'Height']
tide_predictions['Hour']=tide_predictions['Hour'].str[-5:-3].astype(int)
+ (tide_predictions['Hour'].str[-2:].astype(int))/60
tide_predictions['Height']=tide_predictions['Height'].astype(float)
tide_predictions.sort_values('Hour')
tide_predictions.head()
```

Out[6]:

	Hour	Height
0	0.0	2.095
1	0.1	1.968
2	0.2	1.841
3	0.3	1.714
4	0.4	1.588

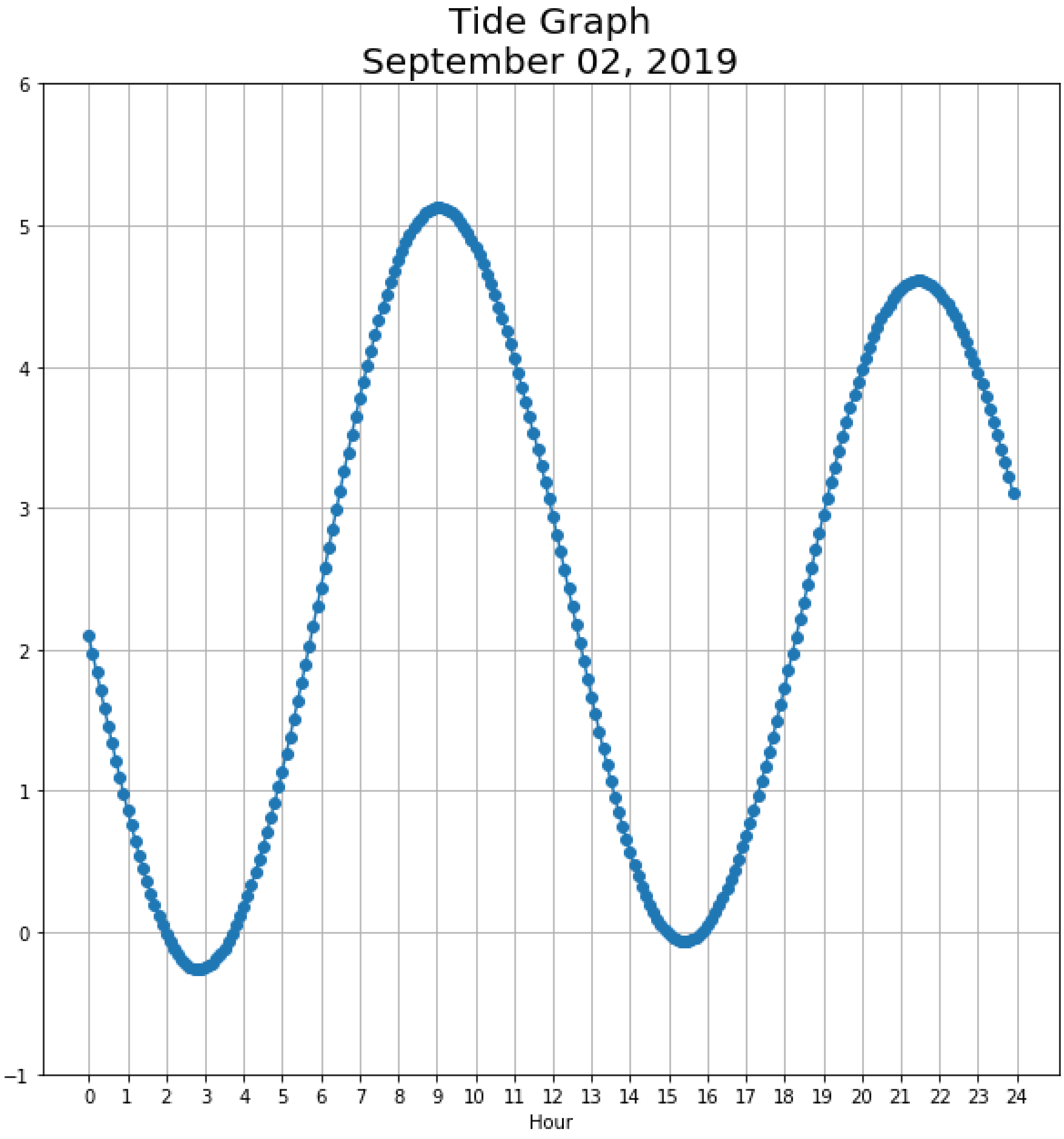
In [7]:

```
tide_predictions.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 240 entries, 0 to 239
Data columns (total 2 columns):
Hour      240 non-null float64
Height    240 non-null float64
dtypes: float64(2)
memory usage: 3.8 KB
```

In [8]:

```
%matplotlib inline
plt.figure(figsize=(10, 10))
plt.plot(tide_predictions['Hour'], tide_predictions['Height'], marker=
'o')
plt.ylim(-1, 6)
plt.title("Tide Graph\n{:%B %d, %Y}".format(today), fontsize=20)
plt.grid(axis='both')
plt.xticks(range(0, 25))
plt.xlabel('Hour')
plt.show()
```



In [9]:

```
# Calculate times for high and low tides.

def max_tide(series):
    """Returns list of indices for which 'height' is a relative maximum."""
    maxima = []
    for i in range(238):
        if series.iloc[i] <= series.iloc[i+1] and series.iloc[i+1] >= series.iloc[i+2]:
            maxima.append(i+1)
    return maxima


def min_tide(series):
    """Returns list of indices for which 'height' is a relative minimum."""
    minima = []
    for i in range(238):
        if series.iloc[i] >= series.iloc[i+1] and series.iloc[i+1] <= series.iloc[i+2]:
            minima.append(i+1)
    return minima


def hour_to_time(hpm):
    """Converts 'hours past midnight' to 'time of day'."""
    h = int(hpm)
    m = int(round((hpm - h) * 60, 0))

    if h == 0 or h == 12:
        hour = '12'
    else:
        hour = str(h % 12)

    if m < 10:
        minute = '0' + str(m)
    else:
        minute = str(m)

    if h < 12:
        meridiam = 'AM'
    else:
        meridiam = 'PM'

    return  hour + ':' + minute + ' ' + meridiam


maxima = max_tide(tide_predictions['Height'])
minima = min_tide(tide_predictions['Height'])

high_tide = tide_predictions.iloc[maxima].copy()
high_tide.loc[:, 'Event'] = 'High Tide'

low_tide = tide_predictions.iloc[minima].copy()
low_tide.loc[:, 'Event'] = 'Low Tide'
```

```
tide_table = pd.concat([high_tide, low_tide], ignore_index=True)

tide_table['Time'] = tide_table['Hour'].apply(hour_to_time)
tide_table = tide_table[['Time', 'Hour', 'Height', 'Event']]
tide_table.sort_values('Hour', inplace=True)
tide_table.index = list(range(len(tide_table)))
tide_table
```

Out[9]:

	Time	Hour	Height	Event
0	2:48 AM	2.8	-0.257	Low Tide
1	9:00 AM	9.0	5.122	High Tide
2	9:06 AM	9.1	5.122	High Tide
3	3:24 PM	15.4	-0.063	Low Tide
4	9:24 PM	21.4	4.607	High Tide

In [ ]: