In [19]:
```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt

plt.style.use('seaborn')
%matplotlib inline
```

How to get temperature data in sql

Get global data sql query

```
SELECT * FROM global_data
```

Get Soeul data sql query

```
SELECT * FROM city_data
WHERE city = 'Seoul'
```

How to read data using python

- Temperature data download csv-file
- Dataset load `DataFrame` of Pandas

In [2]:
```
globalData = pd.read_csv("global_data.csv")
seoulData = pd.read_csv("seoul_data.csv")

print("Global Data Shape: {}".format(globalData.shape))
print("Seoul Data Shape: {}".format(seoulData.shape))
```

```
Global Data Shape: (266, 2)
Seoul Data Shape: (175, 4)
```

Overview dataset

In [3]:
```
print(seoulData.head(10))
print("₩n")
print(globalData.head(10))
```

```
   year   city      country  avg_temp
0  1839  Seoul  South Korea      9.47
1  1840  Seoul  South Korea     10.21
2  1841  Seoul  South Korea      9.44
3  1842  Seoul  South Korea     10.13
4  1843  Seoul  South Korea     10.33
5  1844  Seoul  South Korea     10.15
6  1845  Seoul  South Korea     10.25
7  1846  Seoul  South Korea     10.57
8  1847  Seoul  South Korea     10.59
9  1848  Seoul  South Korea     10.36


   year  avg_temp
0  1750      8.72
1  1751      7.98
```

```
2  1752    5.78
3  1753    8.39
4  1754    8.47
5  1755    8.36
6  1756    8.85
7  1757    9.02
8  1758    6.74
9  1759    7.99
```

Calculate Moving Average and Transform DataFrame

In [4]:
```
def CalculateMovingAverage(df, windowSize = 7):
    data =[]
    for i in range(windowSize, df.shape[0] - windowSize):
        data.append([df.year[i], pd.DataFrame.sum(df.avg_temp[i - windowSize:i])/winc

    dfTemp = pd.DataFrame(data = data, columns = ("year", "avg_temp"))
    return dfTemp

dfGlobal = CalculateMovingAverage(globalData, 7)
dfSeoul = CalculateMovingAverage(seoulData, 7)
```

Calculate Statistical Measurements

- Standard deviation
- Mean
- Minimum and Maximum values
- Med

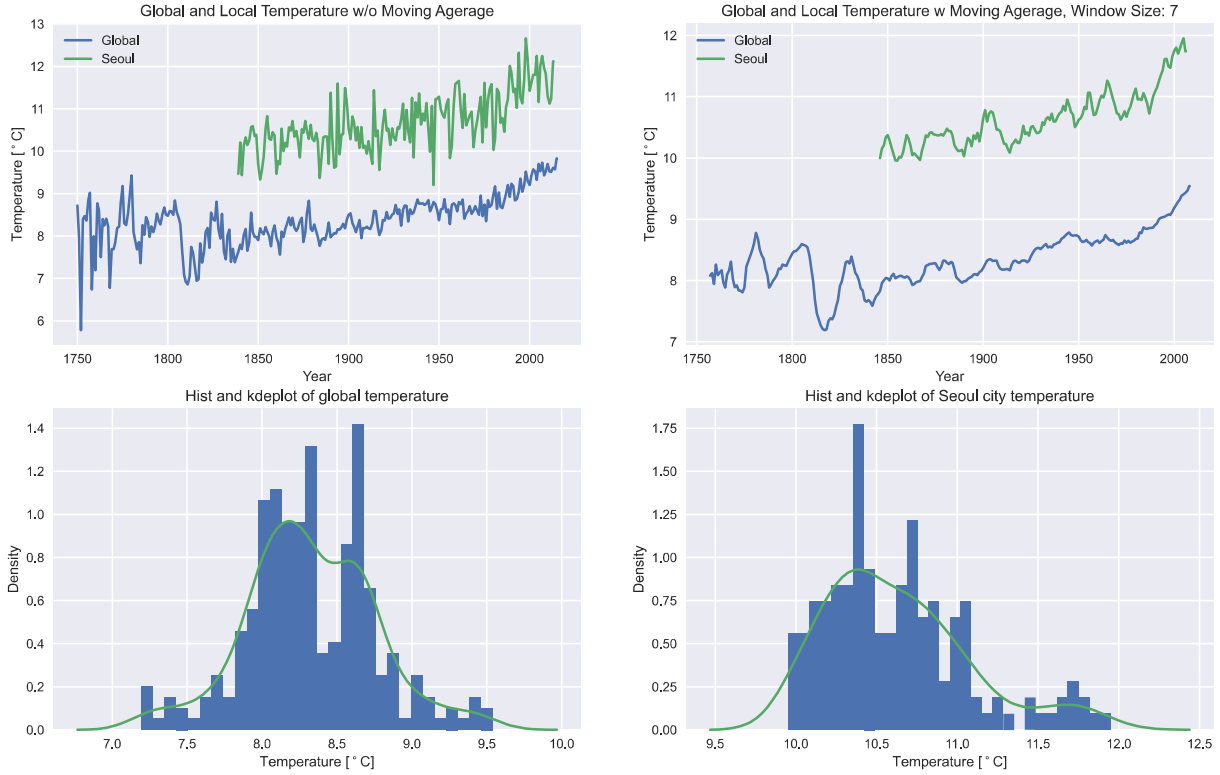
In [5]:
```
print("Statistical measurements of temperatures: ")
print("       Global   Seoul")
print("Std  : {:.4f}   {:.4f}".format(dfGlobal.avg_temp.std(), dfSeoul.avg_temp.std()
print("Mean : {:.4f}   {:.4f}".format(dfGlobal.avg_temp.mean(), dfSeoul.avg_temp.mean
print("Min  : {:.4f}   {:.4f}".format(dfGlobal.avg_temp.min(), dfSeoul.avg_temp.min()
print("Max  : {:.4f}   {:.4f}".format(dfGlobal.avg_temp.max(), dfSeoul.avg_temp.max()
print("Med  : {:.4f}   {:.4f}".format(dfGlobal.avg_temp.median(), dfSeoul.avg_temp.me
```

```
Statistical measurements of temperatures:
       Global   Seoul
Std  : 0.4276   0.4475
Mean : 8.3220   10.6298
Min  : 7.1914   9.9543
Max  : 9.5414   11.9514
Med  : 8.2943   10.5529
```

Visualization Data using Matplotlib

In [29]:
```
fig, ax = plt.subplots(2,2, figsize = (16, 10))

ax[0,0].plot(globalData.year, globalData.avg_temp, label = "Global")
ax[0,0].plot(seoulData.year, seoulData.avg_temp, label = "Seoul")
ax[0,0].set_title("Global and Local Temperature w/o Moving Agerage")
ax[0,0].set_xlabel("Year")
ax[0,0].set_ylabel("Temperature [$^\circ$C]")
ax[0,0].legend()

ax[0, 1].plot(dfGlobal.year, dfGlobal.avg_temp, label = "Global")
```

```
ax[0, 1].plot(dfSeoul.year, dfSeoul.avg_temp, label = "Seoul")
ax[0, 1].set_title("Global and Local Temperature w Moving Agerage, Window Size: 7")
ax[0, 1].set_xlabel("Year")
ax[0, 1].set_ylabel("Temperature [$^\circ$C]")
ax[0, 1].legend()

ax[1, 0].hist(dfGlobal.avg_temp, bins = 30, density = True)
sns.kdeplot(ax = ax[1,0], x = dfGlobal.avg_temp)
ax[1, 0].set_title("Hist and kdeplot of global temperature")
ax[1, 0].set_xlabel("Temperature [$^\circ$C]")

ax[1, 1].hist(dfSeoul.avg_temp, bins = 30, density = True)
sns.kdeplot(ax = ax[1,1], x = dfSeoul.avg_temp)
ax[1, 1].set_xlabel("Temperature [$^\circ$C]")
ax[1, 1].set_title("Hist and kdeplot of Seoul city temperature")

plt.show()
```



In [40]:
```
print(dfGlobal.avg_temp[np.where(dfGlobal.year == 2000)[0]].item()₩
      - dfGlobal.avg_temp[np.where(dfGlobal.year == 1850)[0]].item())
print(seoulData.avg_temp[np.where(seoulData.year == 2000)[0]].item()₩
      - seoulData.avg_temp[np.where(seoulData.year == 1850)[0]].item())
```

```
1.1485714285714277
1.7300000000000004
```

Observations

- Temperature of the world is mean 8.32 °C and standard deviation 0.43 °C
- Temperature of Seoul city is mean 10.63 °C and standard deviation 0.45 °C
- Mean of temperature of Seoul city is greater than the world over 2.30 °C
- The world temperature is increased 1.15 °C from 1850 to 2000
- Seoul city temperature is increased 1.73 °C from 1850 to 2000
- Temperature increase in Seoul city is 0.48 °C higher than the world