Use Scipy

We have the min and max temperatures in a city In India for each months of the year.

We would like to find a function to describe this and show it graphically, the dataset given below.

Task:

1. fitting it to the periodic function

2. plot the fit

Data

Max = 39, 41, 43, 47, 49, 51, 45, 38, 37, 29, 27, 25

Min = 21, 23, 27, 28, 32, 35, 31, 28, 21, 19, 17, 18

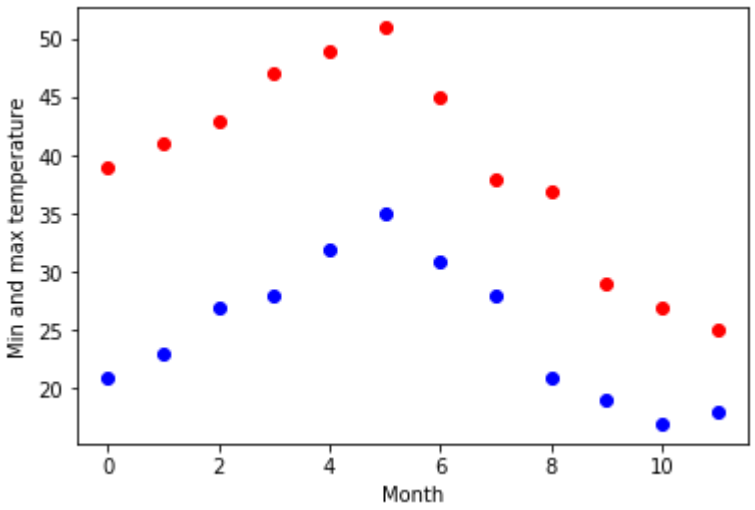
In [1]:
```
import numpy as np
temp_max = np.array([39, 41, 43, 47, 49, 51, 45, 38, 37, 29, 27, 25])
temp_min = np.array([21, 23, 27, 28, 32, 35, 31, 28, 21, 19, 17, 18])
```

In [2]:
```
temp_max
```

Out[2]:
```
array([39, 41, 43, 47, 49, 51, 45, 38, 37, 29, 27, 25])
```

In [3]:
```
import matplotlib.pyplot as plt
%matplotlib inline

months = np.arange(12)

plt.plot(months, temp_max, 'ro')
plt.plot(months, temp_min, 'bo')

plt.xlabel('Month')
plt.ylabel('Min and max temperature')
```

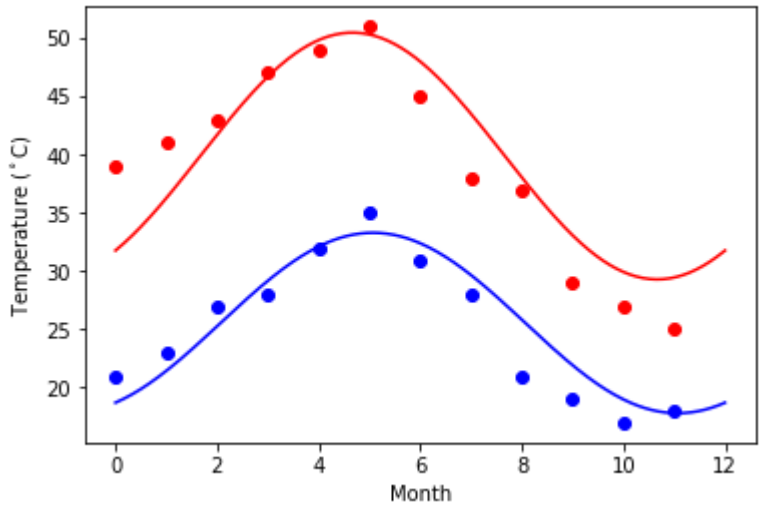
Out[3]:
```
Text(0,0.5,'Min and max temperature')
```



In [4]:
```
from scipy import optimize
def yearly_temps(times, avg, ampl, time_offset):
    return (avg + ampl * np.cos((times + time_offset) * 2 * np.pi / times.max()))

res_max, cov_max = optimize.curve_fit(yearly_temps, months, temp_max, [20, 10, 0]
res_min, cov_min = optimize.curve_fit(yearly_temps, months, temp_min, [-40, 20, 0

print(res_max)
print(res_min)
```

```
[ 39.88861734 -10.59083168   1.33370154]
[25.55626462 -7.74472963  0.93101294]
```

In [5]:
```
# plot data using params


days = np.linspace(0, 12, num=365)


# plt.figure()

plt.plot(months, temp_max, 'ro')
plt.plot(days, yearly_temps(days, *res_max), 'r-')
# '-': solid line style


plt.plot(months, temp_min, 'bo')
plt.plot(days, yearly_temps(days, *res_min), 'b-')


plt.xlabel('Month')
plt.ylabel('Temperature ($^\circ$C)')

plt.show()
```



Matplotlib:

data to use:

url=https://raw.githubusercontent.com/Geoyi/Cleaning-Titanic-Data/master/titanic_original.csv (https://raw.githubusercontent.com/Geoyi/Cleaning-Titanic-Data/master/titanic_original.csv)

titanic = pd.read_csv(url)

Charts to plot:

1. Create a pie chart presenting the male/female proportion

2. Create a scatterplot with the Fare paid and the Age, differ the plot color by gender

In [6]:
```
import pandas as pd

url="https://raw.githubusercontent.com/Geoyi/Cleaning-Titanic-Data/master/titanic_
titanic = pd.read_csv(url)
```

In [7]:
```
titanic.head()
```

Out[7]:

	pclass	survived	name	sex	age	sibsp	parch	ticket	fare	cabin	embarked
0	1.0	1.0	Allen, Miss. Elisabeth Walton	female	29.0000	0.0	0.0	24160	211.3375	B5	S
1	1.0	1.0	Allison, Master. Hudson Trevor	male	0.9167	1.0	2.0	113781	151.5500	C22 C26	S
2	1.0	0.0	Allison, Miss. Helen Loraine	female	2.0000	1.0	2.0	113781	151.5500	C22 C26	S
3	1.0	0.0	Allison, Mr. Hudson Joshua Creighton	male	30.0000	1.0	2.0	113781	151.5500	C22 C26	S
4	1.0	0.0	Allison, Mrs. Hudson J C (Bessie Waldo Daniels)	female	25.0000	1.0	2.0	113781	151.5500	C22 C26	S

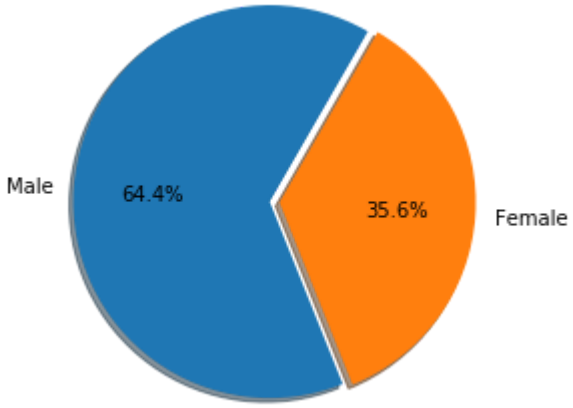
In [8]:
```
titanic.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1310 entries, 0 to 1309
Data columns (total 14 columns):
pclass       1309 non-null float64
survived     1309 non-null float64
name         1309 non-null object
sex          1309 non-null object
age          1046 non-null float64
sibsp        1309 non-null float64
parch        1309 non-null float64
ticket       1309 non-null object
fare         1308 non-null float64
cabin        295 non-null object
embarked     1307 non-null object
boat         486 non-null object
body         121 non-null float64
home.dest    745 non-null object
dtypes: float64(7), object(7)
memory usage: 143.4+ KB
```

In [9]:
```
count = titanic['sex'].value_counts()
male_count = count['male']
female_count = count['female']
```

1. Create a pie chart presenting the male/female proportion

In [10]:
```
import matplotlib.pyplot as plt
%matplotlib inline
# Pie chart, where the slices will be ordered and plotted counter-clockwise:
labels = 'Male' , 'Female'
sizes = [male_count, female_count]
explode = (0.00, 0.05)  # only "explode" the 2nd slice (i.e. 'Hogs')

fig1, ax1 = plt.subplots()
ax1.pie(sizes, explode=explode, labels=labels, autopct='%1.1f%%',
        shadow=True, startangle=60)
ax1.axis('equal')  # Equal aspect ratio ensures that pie is drawn as a circle.

plt.show()
```



2. Create a scatterplot with the Fare paid and the Age, differ the plot color by gender

In [11]:
```
import matplotlib.pyplot as plt
%matplotlib inline


#2. Create a scatterplot with the Fare paid and the Age, differ the plot color by
grp = titanic.groupby(["age", "sex"])
grp_unstack = grp.mean()['fare'].unstack()
```

In [12]:
```
grp_unstack.head()
```

Out[12]:

sex	female	male
age		
0.1667	20.5750	NaN
0.3333	NaN	14.4000
0.4167	NaN	8.5167
0.6667	NaN	14.5000
0.7500	19.2583	13.7750

In [13]:
```
d1 = grp_unstack.male.values # Mean Fare for all Male passengers by age
d2 = grp_unstack.female.values # Mean Fare for all Female passengers by age
d3 = grp_unstack.index.values # Age - Making Asge as Index
```

In [ ]:
```

```

In [14]:
```
plt.figure(figsize=(15, 8))

plt.scatter(d3, d1, label='male', alpha=0.8,   cmap='viridis')
plt.scatter(d3, d2, label='female', alpha=0.8,   cmap='viridis')


#plt.scatter(d1, d3, label='male', alpha=0.8,   cmap='viridis')
#plt.scatter(d2, d3, label='female', alpha=0.8,   cmap='viridis')

plt.title('Scatter Plot of Age vs. Fare')

plt.ylabel('Fare Paid By Passenger')
plt.xlabel('Age of Passenger');
plt.legend()
```

Out[14]: <matplotlib.legend.Legend at 0x1eee20aeeb8>