In [72]:
```
#HW3- Piecewise Data fitting
# 0. Import the necessary libraries
# ------------------------------------------------------------------------
import numpy as np
import pandas as pd
import scipy.stats as sts
import matplotlib.pyplot as plt
import scipy.optimize as opt # minimizing procedure
from scipy.interpolate import*
import matplotlib
from mpl_toolkits.mplot3d import Axes3D
from matplotlib import cm
from sklearn.cluster import KMeans
from sklearn.preprocessing import MinMaxScaler
#1)Importing Libraries
import matplotlib.pyplot as plt #for plotting. Aliasing matplotlib.pyplot as 'plt'.
import numpy as np #for creating array. Aliasing numpy as 'np'.
from scipy.optimize import curve_fit as cf

#to plot within notebook
import matplotlib.pyplot as plt
# Fitting Polynomial Regression to the dataset

# ------------------------------------------------------------------------
# 1. Load data
# ------------------------------------------------------------------------
# Display settings
# read csv data
df = pd.read_csv('C:/Users/saeid/OneDrive/Documents/claremont/466/Projrct 1/slope.csv')
print (df.columns)
df.head()
```

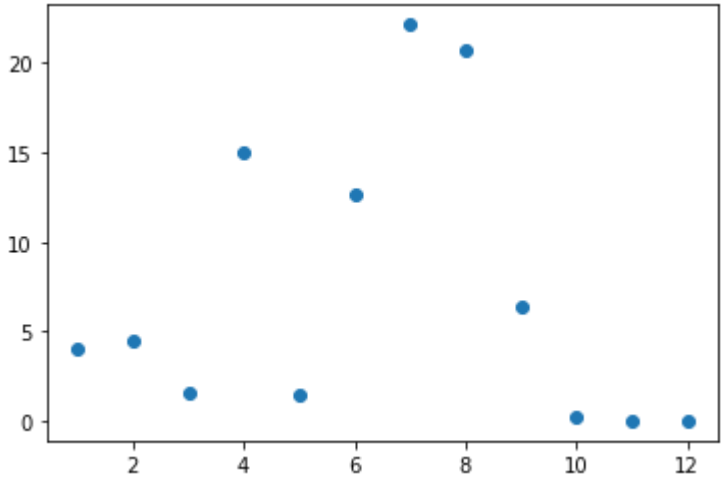
```
Index(['piece', 'slope'], dtype='object')
```

Out[72]:

| | piece | slope |
|---|---|---|
| **0** | 1 | 3.99 |
| **1** | 2 | 4.47 |
| **2** | 3 | 1.55 |
| **3** | 4 | 15.00 |
| **4** | 5 | 1.42 |

In [73]:
```
plt.scatter(df['piece'],df['slope'])
```

Out[73]:
```
<matplotlib.collections.PathCollection at 0x2829092e880>
```




In [74]:
```
km=KMeans(n_clusters=3)
km
```

Out[74]:
```
KMeans(n_clusters=3)
```

In [75]:
```
y_predicted=km.fit_predict(df[['piece','slope']])
y_predicted
```

Out[75]:
```
array([0, 0, 0, 1, 0, 1, 1, 1, 2, 2, 2, 2])
```

In [77]:
```
df['cluster']=y_predicted
df.head()
```

Out[77]:

| | piece | slope | cluster |
|---|---|---|---|
| **0** | 1 | 3.99 | 0 |
| **1** | 2 | 4.47 | 0 |
| **2** | 3 | 1.55 | 0 |
| **3** | 4 | 15.00 | 1 |
| **4** | 5 | 1.42 | 0 |

In [82]:
```
km.cluster_centers_
```

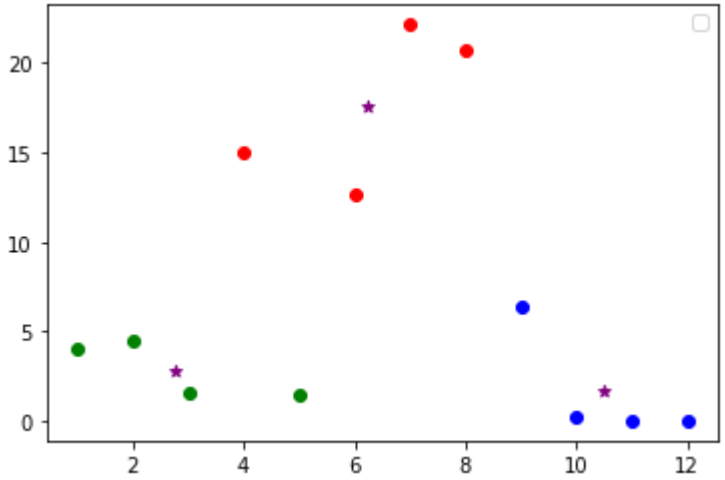
Out[82]:
```
array([[ 2.75  ,  2.8575],
       [ 6.25  , 17.615 ],
       [10.5   ,  1.6835]])
```

In [87]:
```
df1 = df[df.cluster==0]
df2 = df[df.cluster==1]
df3 = df[df.cluster==2]

plt.scatter(df1.piece,df1['slope'],color='green')
plt.scatter(df2.piece,df2['slope'],color='red')
plt.scatter(df3.piece,df3['slope'],color='blue')
plt.scatter(km.cluster_centers_[:,0],km.cluster_centers_[:,1],color='purple',marker='*')
plt.legend()
```

```
No handles with labels found to put in legend.
```

Out[87]:
```
<matplotlib.legend.Legend at 0x28290ba2a00>
```




In [ ]:
```
```