In [1]:

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn.cluster import KMeans
from sklearn import preprocessing
import mpl_toolkits

# Load data
df = pd.read_csv("cereal.csv")

# Replace all '-1' with NaN and remove
df.replace(-1, np.NaN, inplace=True)
df.dropna(inplace = True)
```

In [2]:

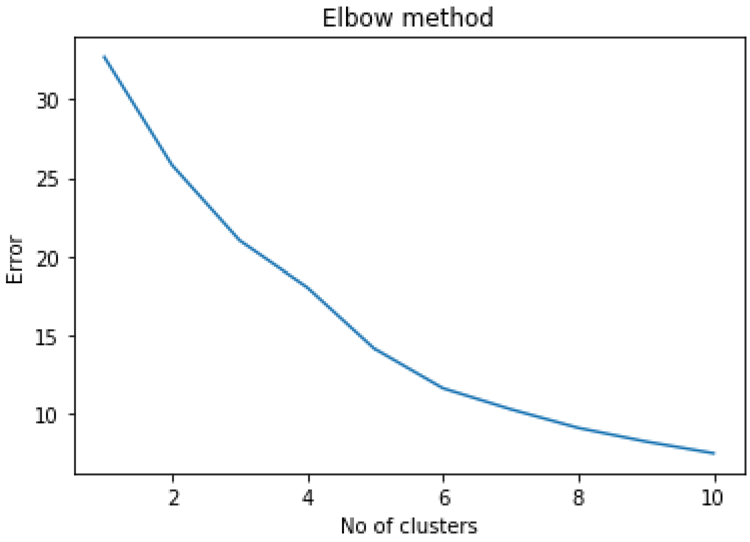
```
X = df[["calories", "protein", "fat", "sodium", "fiber", "carbo", "sugars", "pota
```

In [3]:

```
min_max_scaler = preprocessing.MinMaxScaler()
norm_X = pd.DataFrame(min_max_scaler.fit_transform(X.values), columns = X.columns
```

In [4]:

```
Error =[]
for i in range(1, 11):
    kmeans = KMeans(n_clusters = i).fit(norm_X)
    kmeans.fit(norm_X)
    Error.append(kmeans.inertia_)
import matplotlib.pyplot as plt
plt.plot(range(1, 11), Error)
plt.title('Elbow method')
plt.xlabel('No of clusters')
plt.ylabel('Error')
plt.show()
```



In [5]:

```
kmeans2 = KMeans(n_clusters=2)
y_kmeans2 = kmeans2.fit_predict(norm_X)
print(y_kmeans2)
```

```
[0 1 0 0 1 1 1 0 0 1 0 1 1 1 0 0 1 1 1 0 1 0 1 1 0 1 1 1 1 1 0 0 0 1 1 1 0
 1 0 0 1 0 1 1 1 0 1 1 0 1 1 0 0 0 0 1 1 0 0 0 0 0 0 1 0 0 0 1 0 0 1 0 0 1]
```

In [6]:

```
d = {'Cereal':df['name'], 'Cluster': y_kmeans2, 'Rating': df['rating'], 'Calories
test = pd.DataFrame(data=d)
```

In [32]:

```
test.head()
```

Out[32]:

	Cereal	Cluster	Rating	Calories	Protein	Fat	Sodium	Fiber	Carbohydrates	Sugars	Pc
0	100% Bran	0	68.402973	70	4	1	130	10.0	5.0	6.0	
1	100% Natural Bran	1	33.983679	120	3	5	15	2.0	8.0	8.0	
2	All-Bran	0	59.425505	70	4	1	260	9.0	7.0	5.0	
3	All-Bran with Extra Fiber	0	93.704912	50	4	0	140	14.0	8.0	0.0	
5	Apple Cinnamon Cheerios	1	29.509541	110	2	2	180	1.5	10.5	10.0	

In [8]:

```
df['rating'].median()
```

Out[8]:

```
40.2530865
```

In [9]:

```
cluster_1 = test[test['Cluster'] == 0]
med_1 = cluster_1['Rating'].median()
mean_1 = cluster_1['Rating'].mean()

print("Median of cluster 1: %f" %med_1)
print("Mean of cluster 1: %f" %mean_1)
```

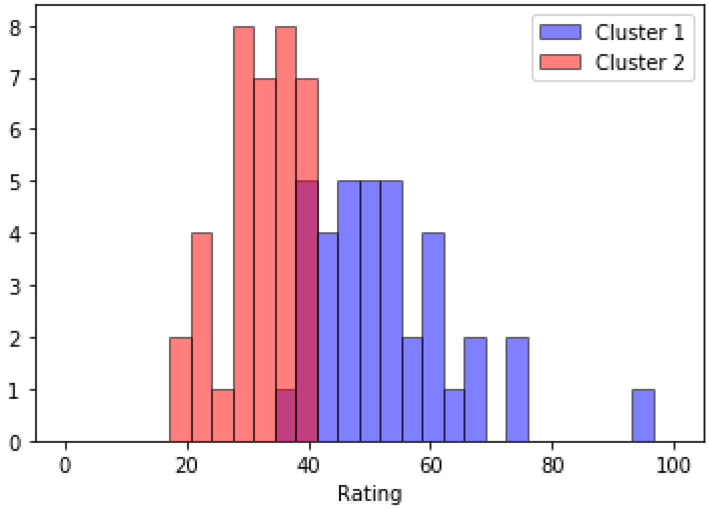
```
Median of cluster 1: 50.764999
Mean of cluster 1: 52.573632
```

In [10]:

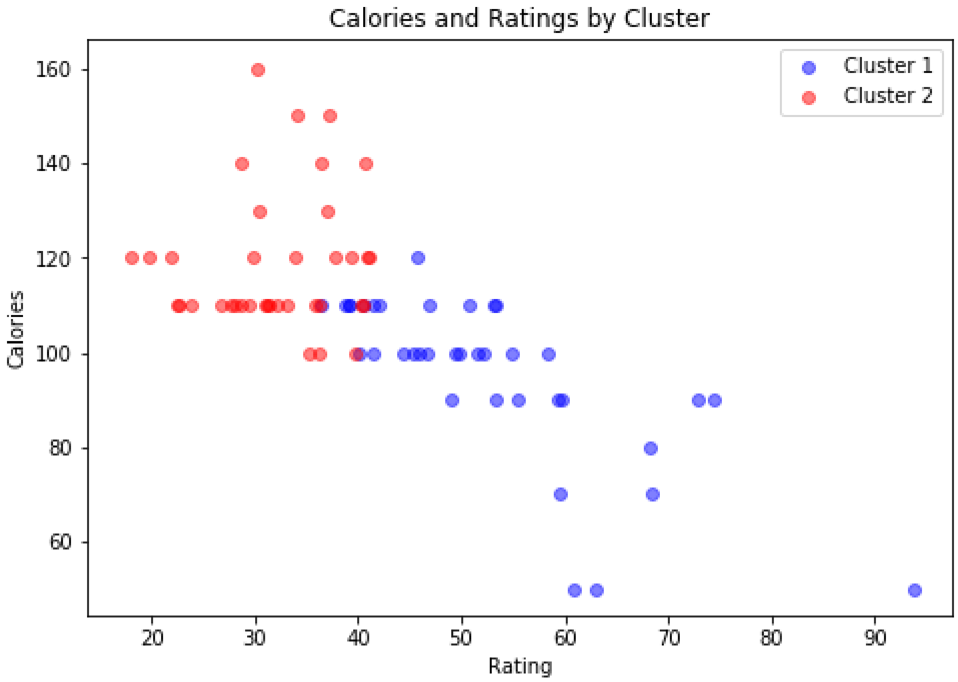
```
cluster_2 = test[test['Cluster'] == 1]
med_2 = cluster_2['Rating'].median()
mean_2 = cluster_2['Rating'].mean()

print("Median of cluster 2: %f" %med_2)
print("Mean of cluster 2: %f" %mean_2)
```

```
Median of cluster 2: 32.207582
Mean of cluster 2: 32.169942
```

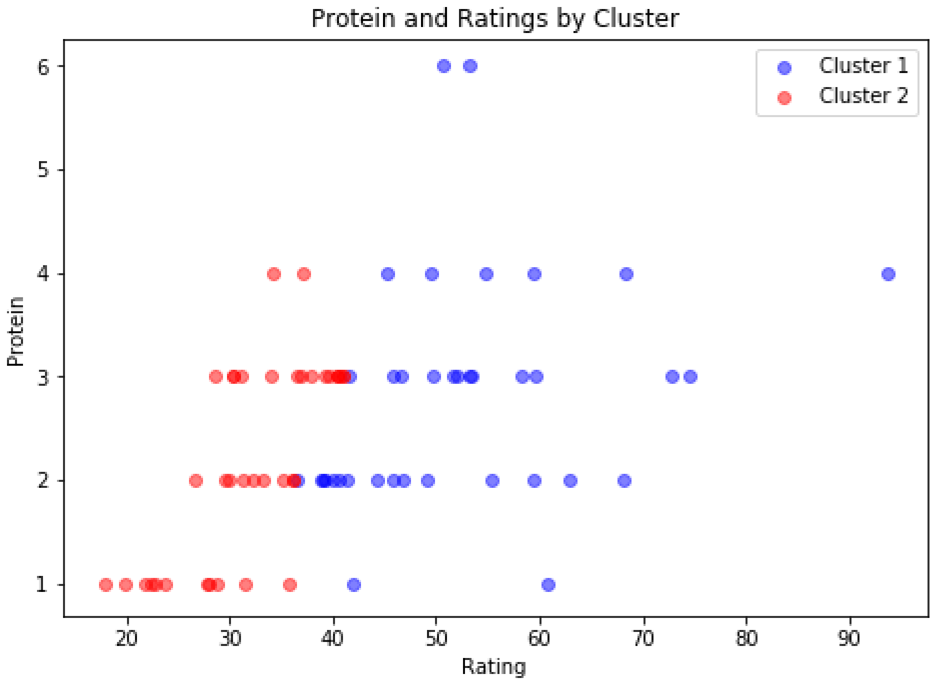
In [12]:
```
from matplotlib import pyplot

bins = np.linspace(0, 100, 30)

pyplot.hist(cluster_1['Rating'], bins, alpha=0.5,edgecolor='black', color = 'blue
pyplot.hist(cluster_2['Rating'], bins, alpha=0.5, edgecolor='black', color = 'red
pyplot.legend(loc='upper right')
pyplot.xlabel('Rating')
pyplot.show()
```



In [14]:
```
fig=plt.figure()
ax=fig.add_axes([0,0,1,1])
ax.scatter(cluster_1['Rating'], cluster_1['Calories'], color='blue', alpha=0.5, l
ax.scatter(cluster_2['Rating'], cluster_2['Calories'], color='red', alpha=0.5, la
ax.set_xlabel('Rating')
ax.set_ylabel('Calories')
ax.set_title('Calories and Ratings by Cluster')
pyplot.legend(loc='upper right')
plt.show()
```

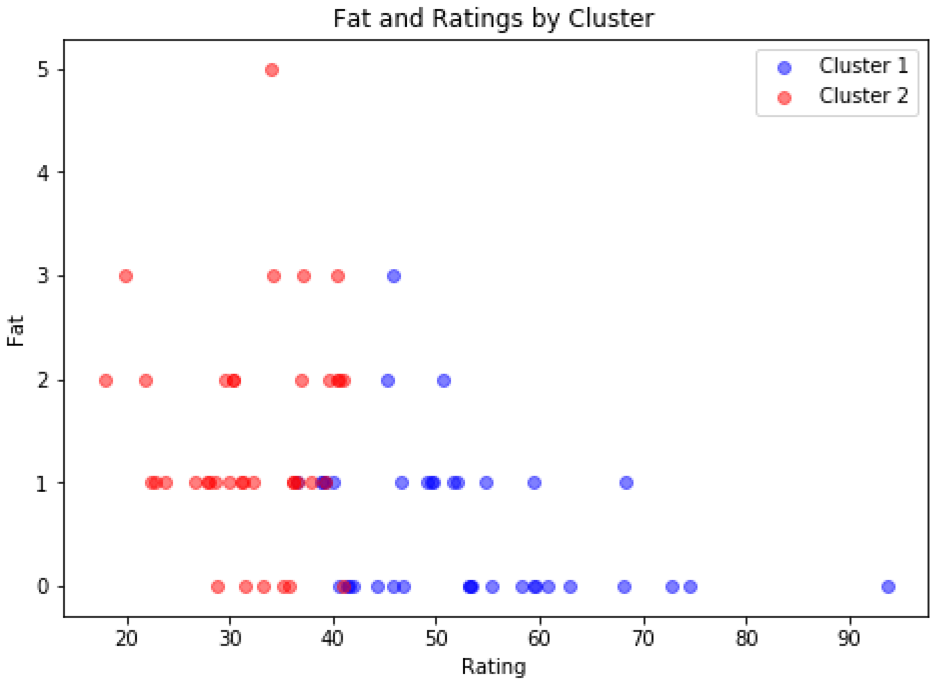


In [18]:
```
fig=plt.figure()
ax=fig.add_axes([0,0,1,1])
ax.scatter(cluster_1['Rating'], cluster_1['Protein'], color='blue', alpha=0.5, la
ax.scatter(cluster_2['Rating'], cluster_2['Protein'], color='red', alpha=0.5, lab
ax.set_xlabel('Rating')
ax.set_ylabel('Protein')
ax.set_title('Protein and Ratings by Cluster')
pyplot.legend(loc='upper right')
plt.show()
```

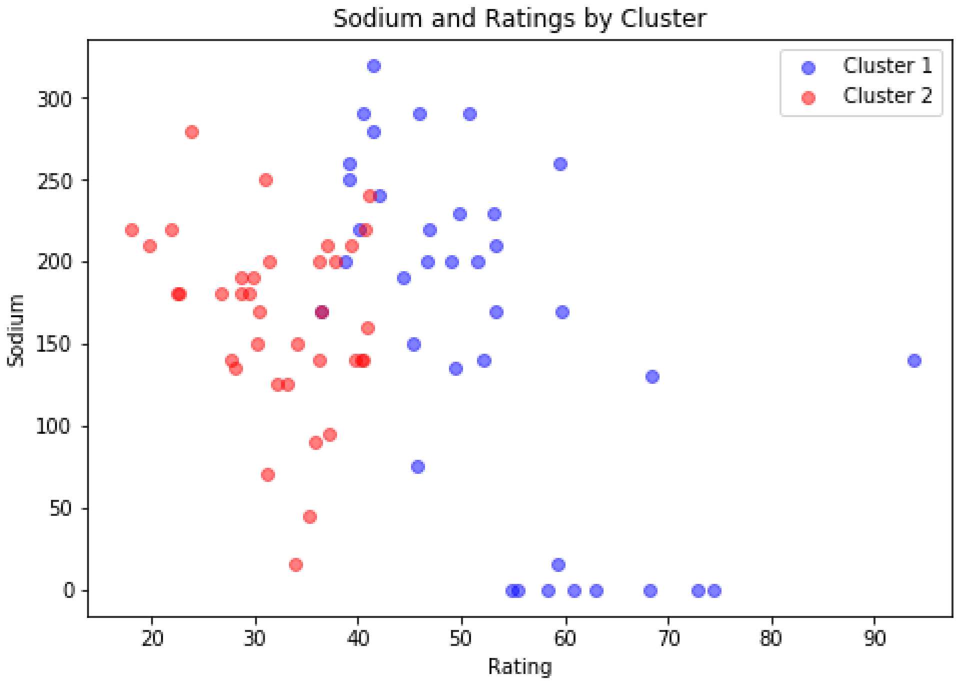


In [23]:

```
fig=plt.figure()
ax=fig.add_axes([0,0,1,1])
ax.scatter(cluster_1['Rating'], cluster_1['Fat'], color='blue', alpha=0.5, label=
ax.scatter(cluster_2['Rating'], cluster_2['Fat'], color='red', alpha=0.5, label='
ax.set_xlabel('Rating')
ax.set_ylabel('Fat')
ax.set_title('Fat and Ratings by Cluster')
pyplot.legend(loc='upper right')
plt.show()
```

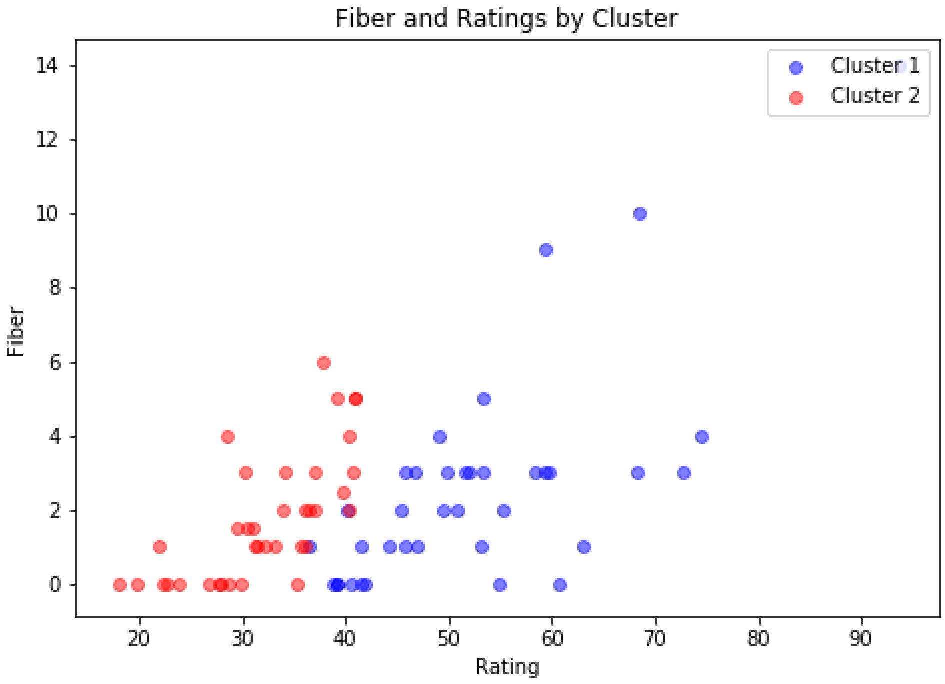


In [25]:
```
fig=plt.figure()
ax=fig.add_axes([0,0,1,1])
ax.scatter(cluster_1['Rating'], cluster_1['Sodium'], color='blue', alpha=0.5, lab
ax.scatter(cluster_2['Rating'], cluster_2['Sodium'], color='red', alpha=0.5, labe
ax.set_xlabel('Rating')
ax.set_ylabel('Sodium')
ax.set_title('Sodium and Ratings by Cluster')
pyplot.legend(loc='upper right')
plt.show()
```

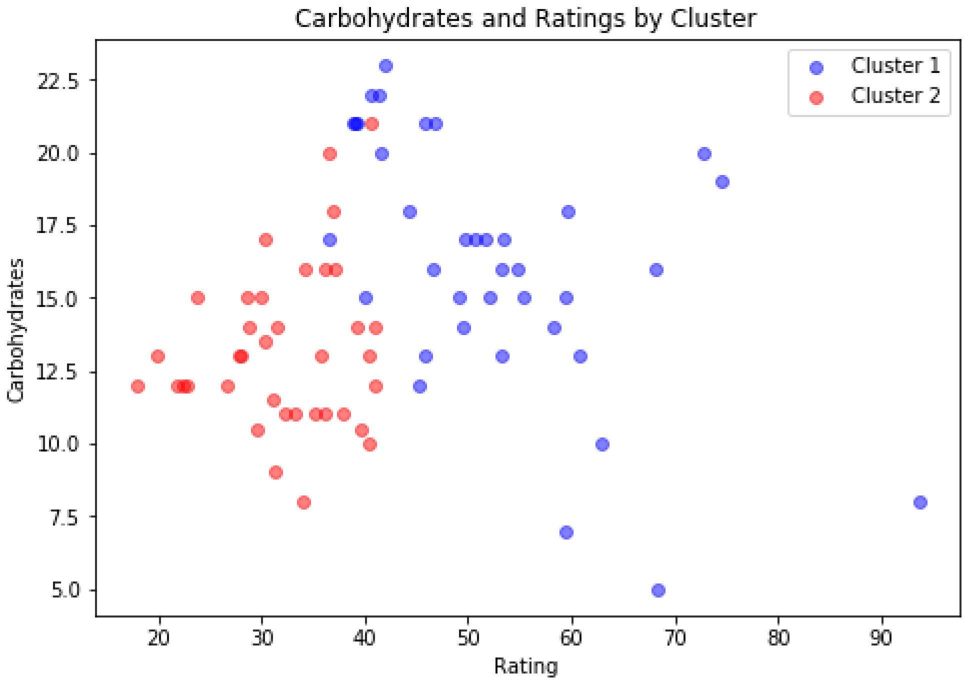


In [26]:

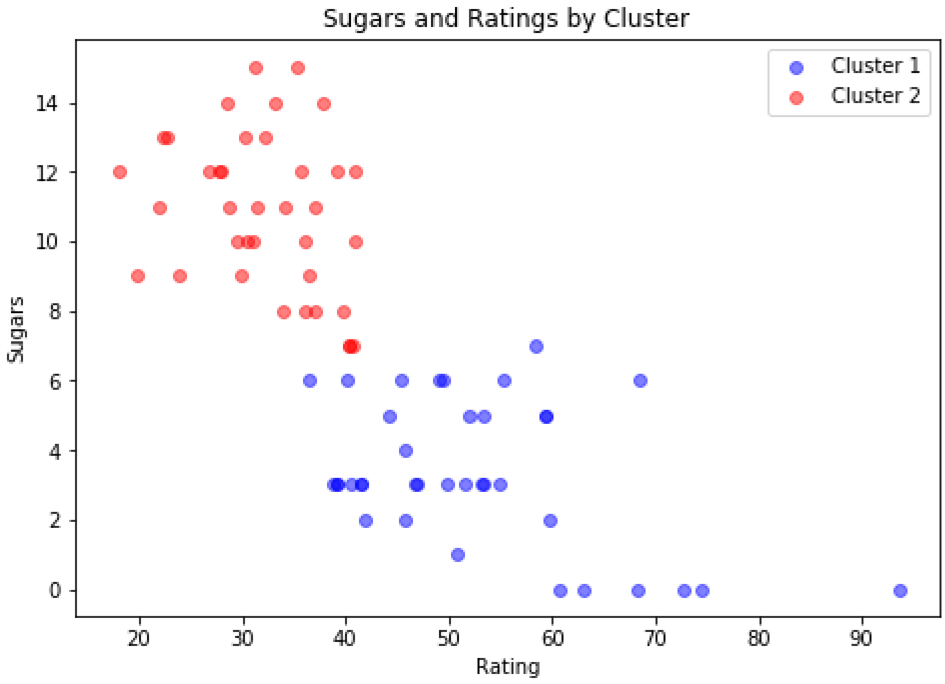
```
fig=plt.figure()
ax=fig.add_axes([0,0,1,1])
ax.scatter(cluster_1['Rating'], cluster_1['Fiber'], color='blue', alpha=0.5, labe
ax.scatter(cluster_2['Rating'], cluster_2['Fiber'], color='red', alpha=0.5, label
ax.set_xlabel('Rating')
ax.set_ylabel('Fiber')
ax.set_title('Fiber and Ratings by Cluster')
pyplot.legend(loc='upper right')
plt.show()
```



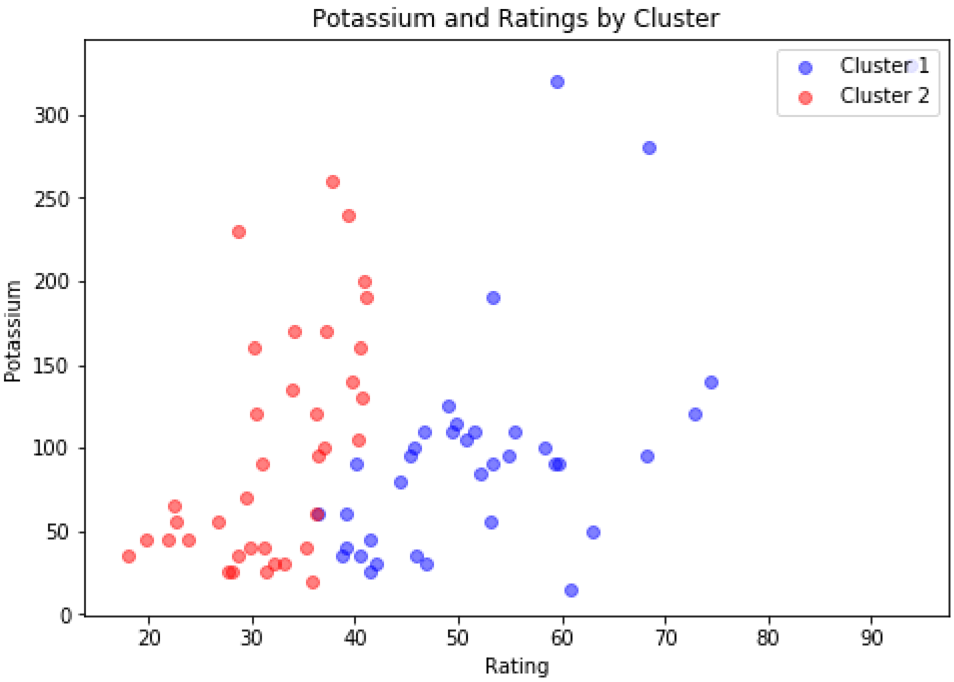
```
In [27]: fig=plt.figure()
         ax=fig.add_axes([0,0,1,1])
         ax.scatter(cluster_1['Rating'], cluster_1['Carbohydrates'], color='blue', alpha=0
         ax.scatter(cluster_2['Rating'], cluster_2['Carbohydrates'], color='red', alpha=0.
         ax.set_xlabel('Rating')
         ax.set_ylabel('Carbohydrates')
         ax.set_title('Carbohydrates and Ratings by Cluster')
         pyplot.legend(loc='upper right')
         plt.show()
```



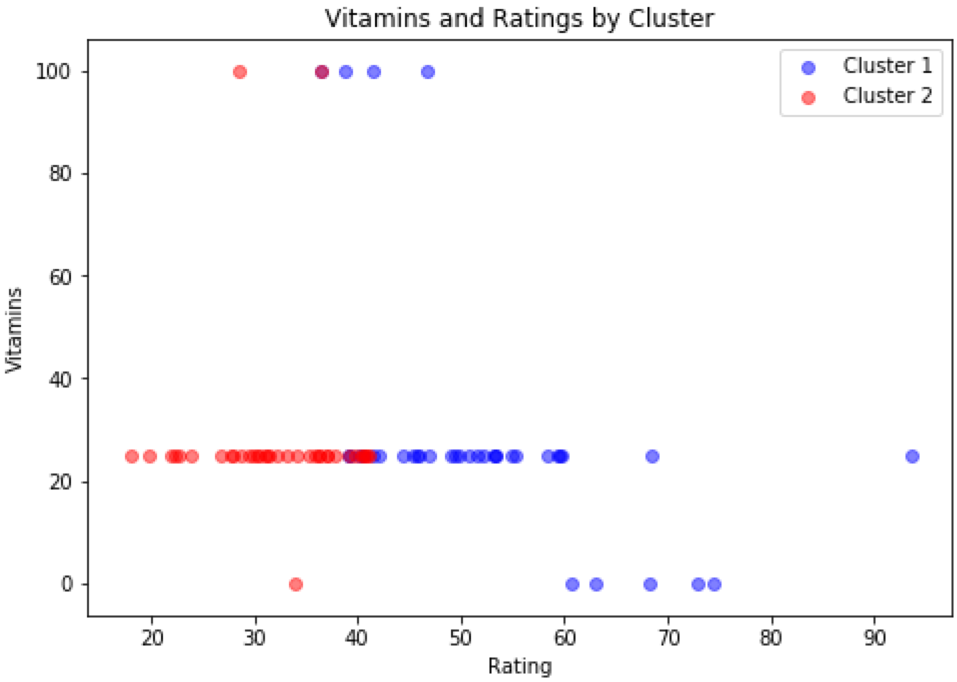
```
In [28]: fig=plt.figure()
         ax=fig.add_axes([0,0,1,1])
         ax.scatter(cluster_1['Rating'], cluster_1['Sugars'], color='blue', alpha=0.5, lab
         ax.scatter(cluster_2['Rating'], cluster_2['Sugars'], color='red', alpha=0.5, labe
         ax.set_xlabel('Rating')
         ax.set_ylabel('Sugars')
         ax.set_title('Sugars and Ratings by Cluster')
         pyplot.legend(loc='upper right')
         plt.show()
```



In [29]:
```
fig=plt.figure()
ax=fig.add_axes([0,0,1,1])
ax.scatter(cluster_1['Rating'], cluster_1['Potassium'], color='blue', alpha=0.5,
ax.scatter(cluster_2['Rating'], cluster_2['Potassium'], color='red', alpha=0.5, l
ax.set_xlabel('Rating')
ax.set_ylabel('Potassium')
ax.set_title('Potassium and Ratings by Cluster')
pyplot.legend(loc='upper right')
plt.show()
```



In [30]:
```
fig=plt.figure()
ax=fig.add_axes([0,0,1,1])
ax.scatter(cluster_1['Rating'], cluster_1['Vitamins'], color='blue', alpha=0.5, l
ax.scatter(cluster_2['Rating'], cluster_2['Vitamins'], color='red', alpha=0.5, la
ax.set_xlabel('Rating')
ax.set_ylabel('Vitamins')
ax.set_title('Vitamins and Ratings by Cluster')
pyplot.legend(loc='upper right')
plt.show()
```



In [34]:
```
test_good = test.loc[test['Cluster'] == 0]
test_bad = test.loc[test['Cluster'] == 1]
```

In [58]:
```
# Sort by highest rating first
test_good = test_good.sort_values('Rating', ascending=False)
# Sort by Lowest rating first
test_bad = test_bad.sort_values('Rating')
```

In [61]:

```
print("TOP 10 GOOD FOR YOU\n", test_good['Cereal'][0:10])
print("\n")
print("TOP 10 BAD FOR YOU\n", test_bad['Cereal'][0:10])
```

```
TOP 10 GOOD FOR YOU
 3     All-Bran with Extra Fiber
64       Shredded Wheat 'n'Bran
65    Shredded Wheat spoon size
0                     100% Bran
63               Shredded Wheat
55                 Puffed Wheat
54                  Puffed Rice
50            Nutri-grain Wheat
2                      All-Bran
68      Strawberry Fruit Wheats
Name: Cereal, dtype: object


TOP 10 BAD FOR YOU
 10           Cap'n'Crunch
12    Cinnamon Toast Crunch
35         Honey Graham Ohs
18            Count Chocula
14              Cocoa Puffs
31           Golden Grahams
42             Lucky Charms
73                     Trix
29           Fruity Pebbles
70        Total Raisin Bran
Name: Cereal, dtype: object
```

In [ ]: