TASK NO.2

THE SPARKS FOUNDATION

DATA SCIENCE & BUSINESS ANALYTICS TASKS

Task 2: From the given 'Iris' dataset, predict the optimum number of clusters and represent it visually (K- Means Clustering)

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Prediction using Unsupervised ML

In [4]:
```
import pandas as pd
import numpy as np
from sklearn import datasets
import matplotlib.pyplot as plt
```

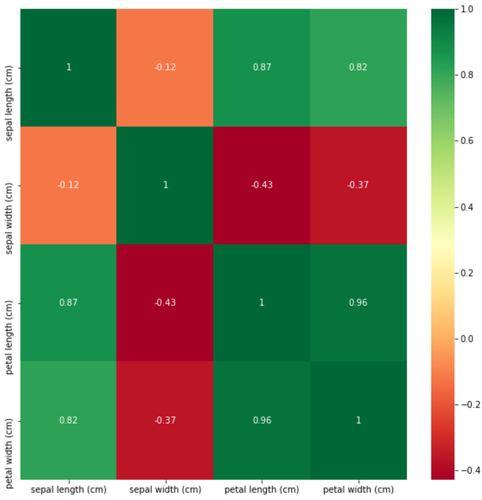
In [5]:
```
#To load the iris data
```

In [6]:
```
iris = datasets.load_iris()
iris_dataframe = pd.DataFrame(iris.data, columns = iris.feature_names)
iris_dataframe.head()
```

Out[6]:

| | sepal length (cm) | sepal width (cm) | petal length (cm) | petal width (cm) |
|---|---|---|---|---|
| **0** | 5.1 | 3.5 | 1.4 | 0.2 |
| **1** | 4.9 | 3.0 | 1.4 | 0.2 |
| **2** | 4.7 | 3.2 | 1.3 | 0.2 |
| **3** | 4.6 | 3.1 | 1.5 | 0.2 |
| **4** | 5.0 | 3.6 | 1.4 | 0.2 |

In [7]:
```
## Finding Correlations
import seaborn as sns
import matplotlib.pyplot as plt
# To obtain correlations of each features in dataset
corrmat = iris_dataframe.corr()
top_corr_features = corrmat.index
plt.figure(figsize=(10,10))
#plot heat map
g=sns.heatmap(iris_dataframe[top_corr_features].corr(),annot=True,cmap="RdYlGn")
```




In [8]:
```
df=pd.DataFrame(iris_dataframe)
df.head()
```

Out[8]:

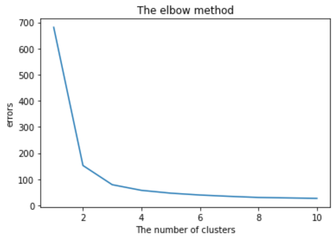
| | sepal length (cm) | sepal width (cm) | petal length (cm) | petal width (cm) |
|---|---|---|---|---|
| **0** | 5.1 | 3.5 | 1.4 | 0.2 |
| **1** | 4.9 | 3.0 | 1.4 | 0.2 |
| **2** | 4.7 | 3.2 | 1.3 | 0.2 |
| **3** | 4.6 | 3.1 | 1.5 | 0.2 |
| **4** | 5.0 | 3.6 | 1.4 | 0.2 |

To find the optimum number of clusters for k-means classification

In [9]:
```
#To find the most favourable no. of clusters for the k-mean classification
```

In [10]:
```
x = df.iloc[:, [0, 1, 2, 3]].values
from sklearn.cluster import KMeans
errors = []
for i in range(1, 11):
    kmeans = KMeans(n_clusters = i).fit(x)
    kmeans.fit(x)
    errors.append(kmeans.inertia_)
```

In [11]:
```
#Elbow method
import matplotlib.pyplot as plt
plt.plot(range(1, 11), errors)
plt.title('The elbow method')
plt.xlabel('The number of clusters')
plt.ylabel('errors')
plt.show()
```




From the above graph,the optimum clusters is where the elbow occurs and this happens when the within cluster sum of squares (WCSS) doesn't decrease significantly with every iteration.

In [12]:
```
#Let us consider the no. of cluster as 3
```

In [13]:
```
#Here we will apply the KMean to the Iris Dataset
kmeans = KMeans(n_clusters = 3, init = 'k-means++', max_iter = 300, n_init = 10, random_state = 0)
y_kmeans = kmeans.fit_predict(x)
```

In [14]:
```
# To visualize cluster on the first two columns
plt.scatter(x[y_kmeans == 0, 0], x[y_kmeans == 0, 1], s = 100, c = 'red', label = 'Iris-setosa')
plt.scatter(x[y_kmeans == 1, 0], x[y_kmeans == 1, 1], s = 100, c = 'blue', label = 'Iris-versicolour')
plt.scatter(x[y_kmeans == 2, 0], x[y_kmeans == 2, 1], s = 100, c = 'orange', label = 'Iris-virginica')
#  To plot the centroids of the clusters
plt.scatter(kmeans.cluster_centers_[:, 0], kmeans.cluster_centers_[:,1], s = 150, c = 'black', label = 'Centroids')
plt.legend()
```

Out[14]:
```
<matplotlib.legend.Legend at 0x208b9942100>
```