K-Means Clustering Algorithm Implementation

In [4]:
```
import matplotlib.pyplot as plt
from sklearn.datasets import make_blobs
import pandas as pd
%matplotlib inline
```

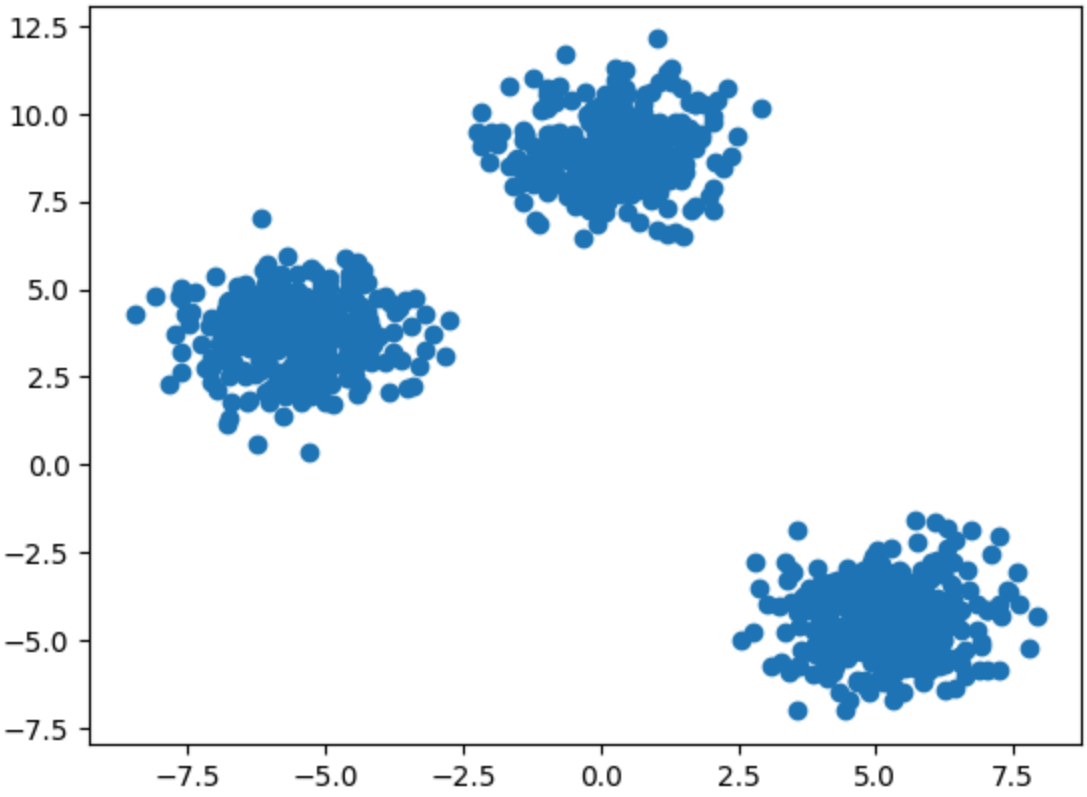
In [6]:
```
X,y = make_blobs(n_samples=1000, centers=3, n_features=2, random_state=23)
# In clustering we dont ake value of y given byt this.
```

In [8]:
```
X.shape # 2 features and 1000 data points
```

Out[8]: (1000, 2)

In [12]:
```
plt.scatter(X[:,0],X[:,1],)
```

Out[12]: <matplotlib.collections.PathCollection at 0x2d50b7d4a50>



In [13]:
```
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X,y, test_size=0.33, random_sta
```

In [14]:
```
from sklearn.cluster import KMeans
```

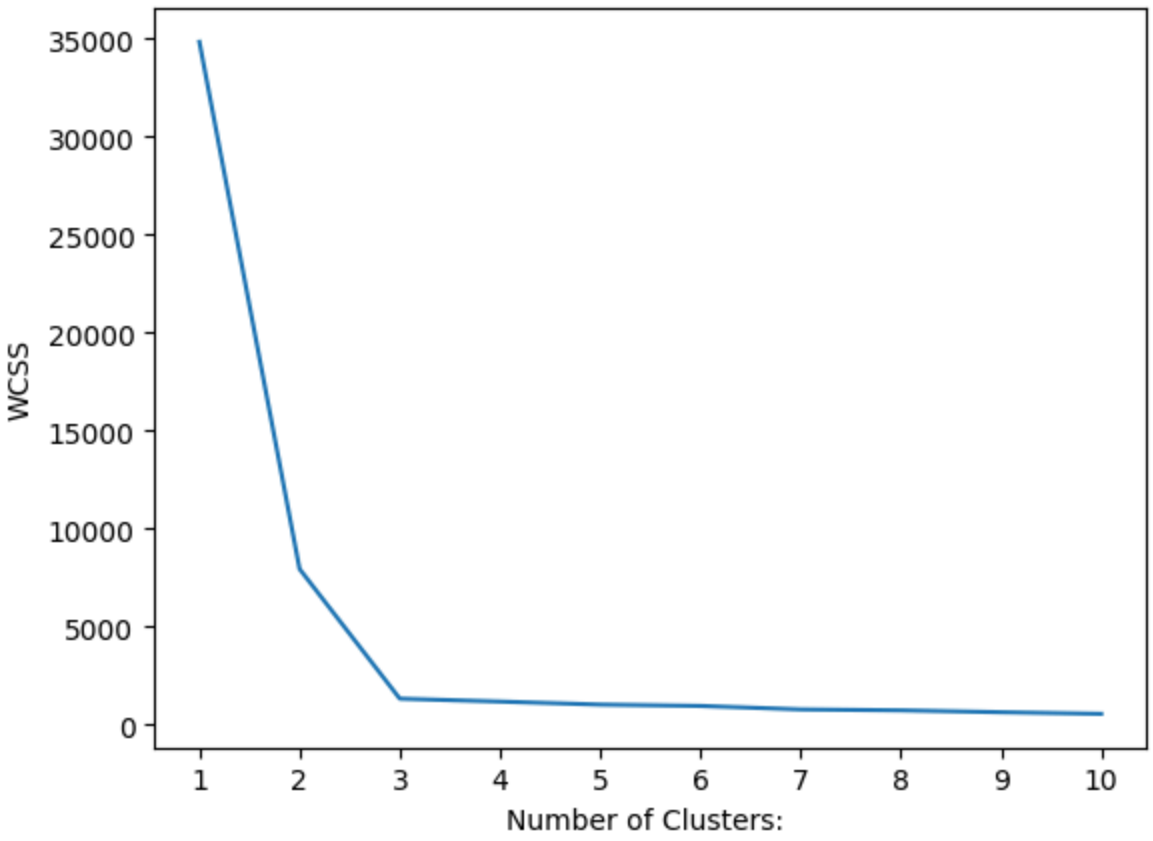
In [16]:
```
# Let us Start With Manual Way
# Elbow Method to Select the K Value

wcss = []
for k in range (1,11):
    kmeans = KMeans(n_clusters=k, init='k-means++')
    kmeans.fit(X_train)
    wcss.append(kmeans.inertia_)
```

In [17]:
```
wcss
```

Out[17]:
```
[34827.57682552021,
 7935.4372861454185,
 1319.2730531585605,
 1171.4379638359776,
 1017.5663459421104,
 949.7658967086777,
 771.1270787645733,
 724.288251816061,
 628.2873517081442,
 546.0327830824484]
```

In [32]:
```
# Plot Elbow Curve
plt.plot(range(1,11), wcss)
plt.xticks(range(1,11))
plt.xlabel("Number of Clusters: ")
plt.ylabel("WCSS")
plt.show()
```

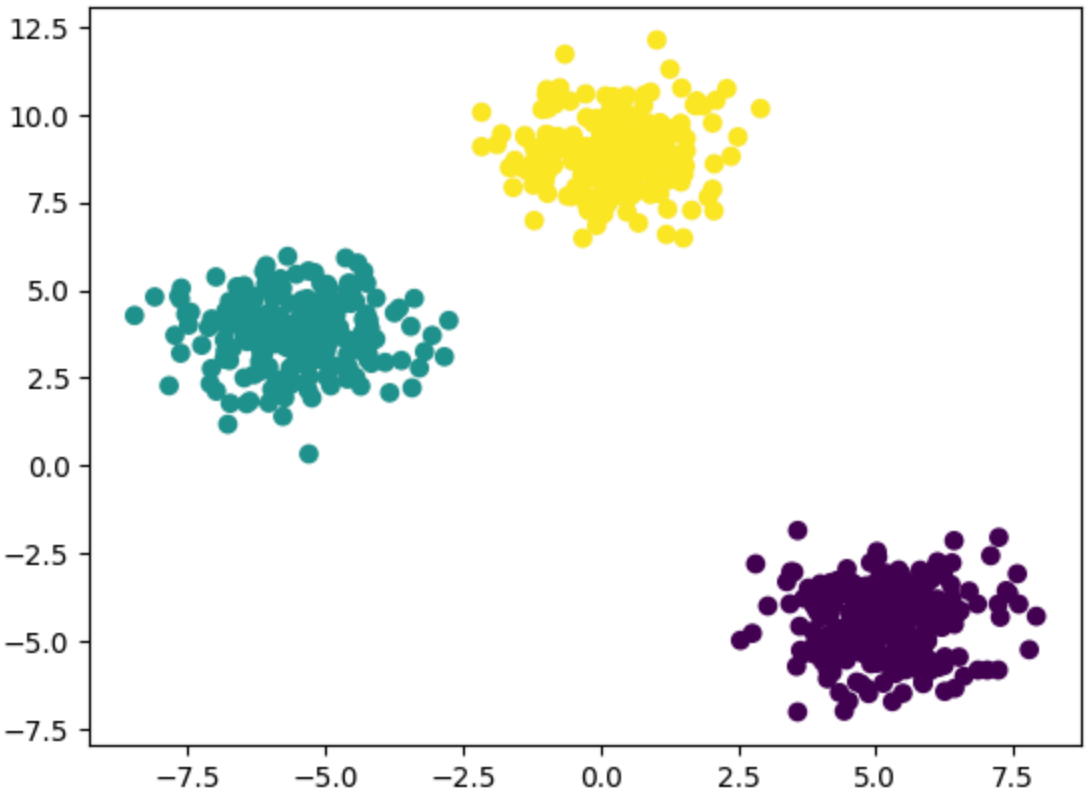


In [50]:
```
kmeans = KMeans(n_clusters=3, init='k-means++')
```

In [51]:
```
y_labels = kmeans.fit_predict(X_train)
```

In [52]:
```
plt.scatter(X_train[:,0],X_train[:,1],c=y_labels)
```

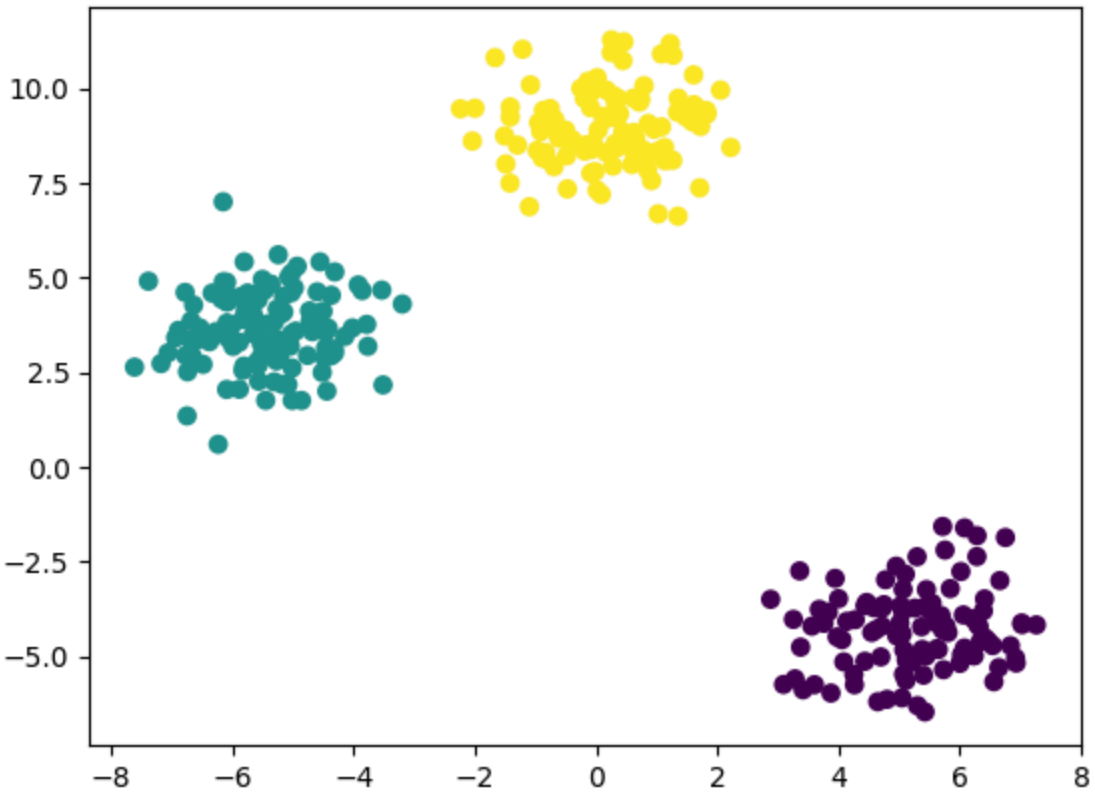
Out[52]:
```
<matplotlib.collections.PathCollection at 0x2d50c880690>
```



In [53]:
```
y_test_labels = kmeans.predict(X_test)
```

In [54]:
```
plt.scatter(X_test[:,0],X_test[:,1],c=y_test_labels)
```

Out[54]:
```
<matplotlib.collections.PathCollection at 0x2d5135882d0>
```



In [55]:
```
# Since this was the Manual way, we can directly do by Knee Locator
```

In [ ]:
```
```

In [56]:
```
# We have another library in sklearn knee locator
```

In [57]:
```
pip install kneed
```

```
Collecting kneed
  Downloading kneed-0.8.5-py3-none-any.whl.metadata (5.5 kB)
Requirement already satisfied: numpy>=1.14.2 in c:\users\krish\appdata\local\program
s\python\python313\lib\site-packages (from kneed) (2.3.2)
Requirement already satisfied: scipy>=1.0.0 in c:\users\krish\appdata\local\programs
\python\python313\lib\site-packages (from kneed) (1.15.2)
Downloading kneed-0.8.5-py3-none-any.whl (10 kB)
Installing collected packages: kneed
Successfully installed kneed-0.8.5
Note: you may need to restart the kernel to use updated packages.
```

In [58]:
```
from kneed import KneeLocator
```

In [61]:
```
kl = KneeLocator(range(1,11),wcss,curve='convex', direction='decreasing')
print(f"So the Number of Clusters is: {kl.elbow}")
# When wcss graph increases then we will use concave here
# When wcss graph decreases then we will use concvex here
```

```
So the Number of Clusters is: 3
```

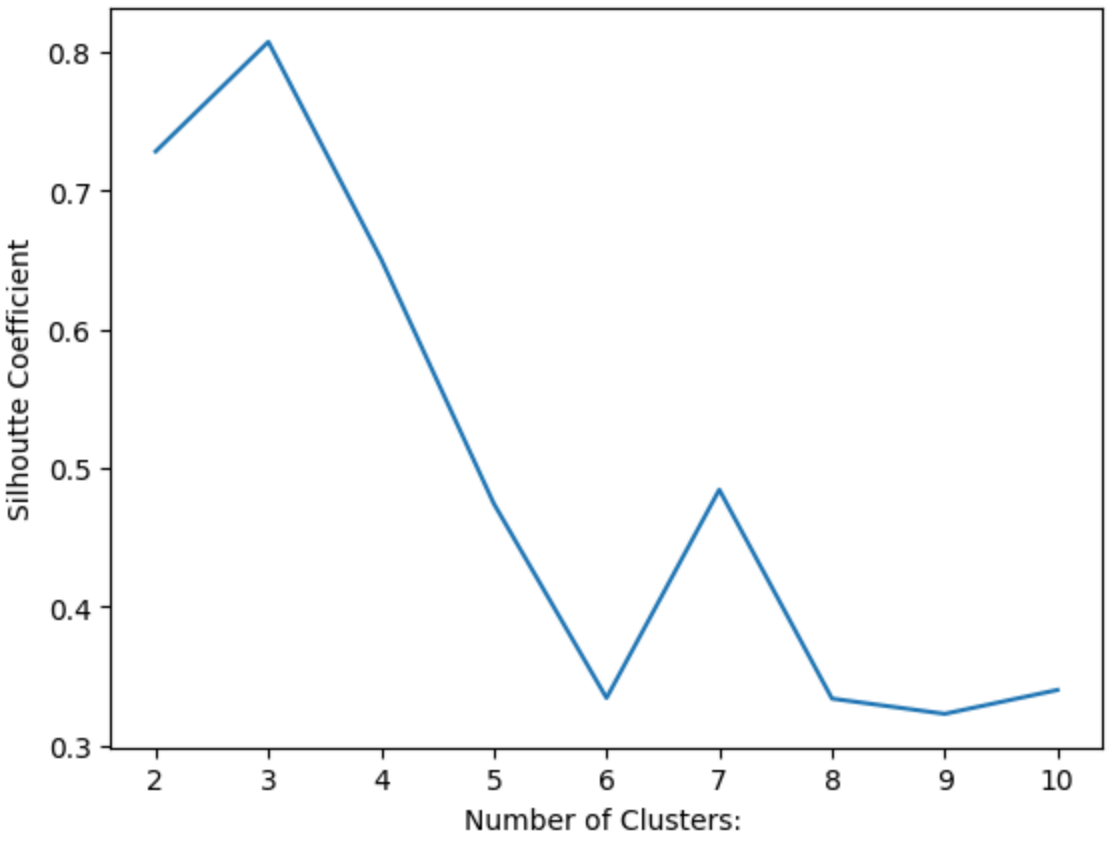
In [65]:
```
## Performance Matrix for Performance Validation
from sklearn.metrics import silhouette_score
```

```
silhouette_cofficients = []
for k in range(2,11):
    kmeans = KMeans(n_clusters=k, init="k-means++")
    kmeans.fit(X_train)
    score = silhouette_score(X_train, kmeans.labels_)
    silhouette_cofficients.append(score)
```

In [67]:
```
print(silhouette_cofficients)
```

```
[0.7281443868598331, 0.8071181203797672, 0.6505454471731087, 0.474362959865786, 0.33
42665605009231, 0.48437019603742126, 0.3338076773060788, 0.3228271330228553, 0.34003
257039494583]
```

In [68]:
```
plt.plot(range(2,11), silhouette_cofficients)
plt.xticks(range(2,11))
plt.xlabel("Number of Clusters: ")
plt.ylabel("Silhoutte Coefficient")
plt.show()
```



In [ ]:
```
```