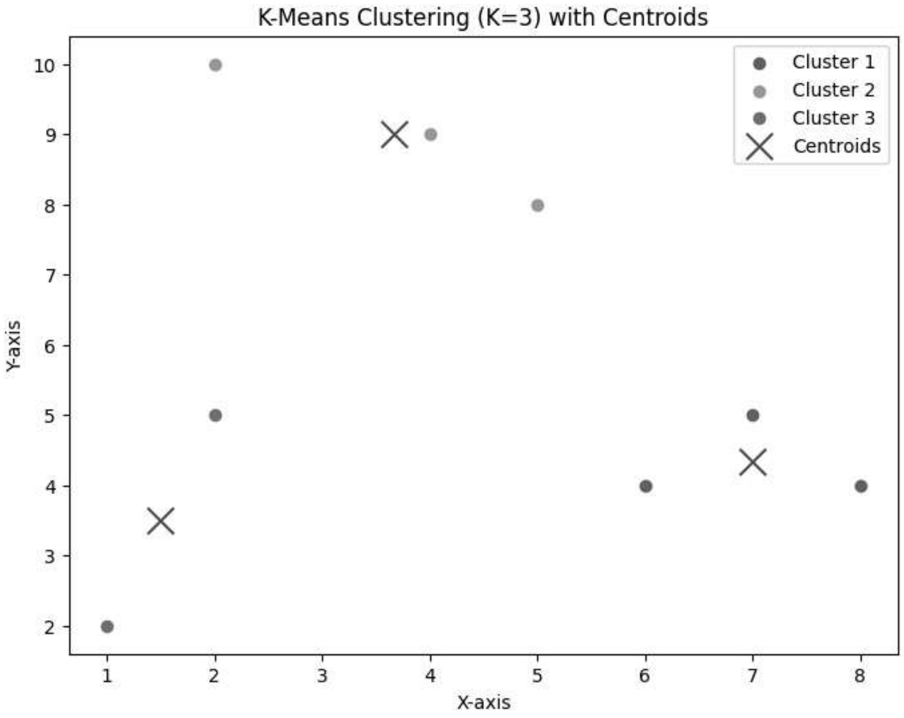
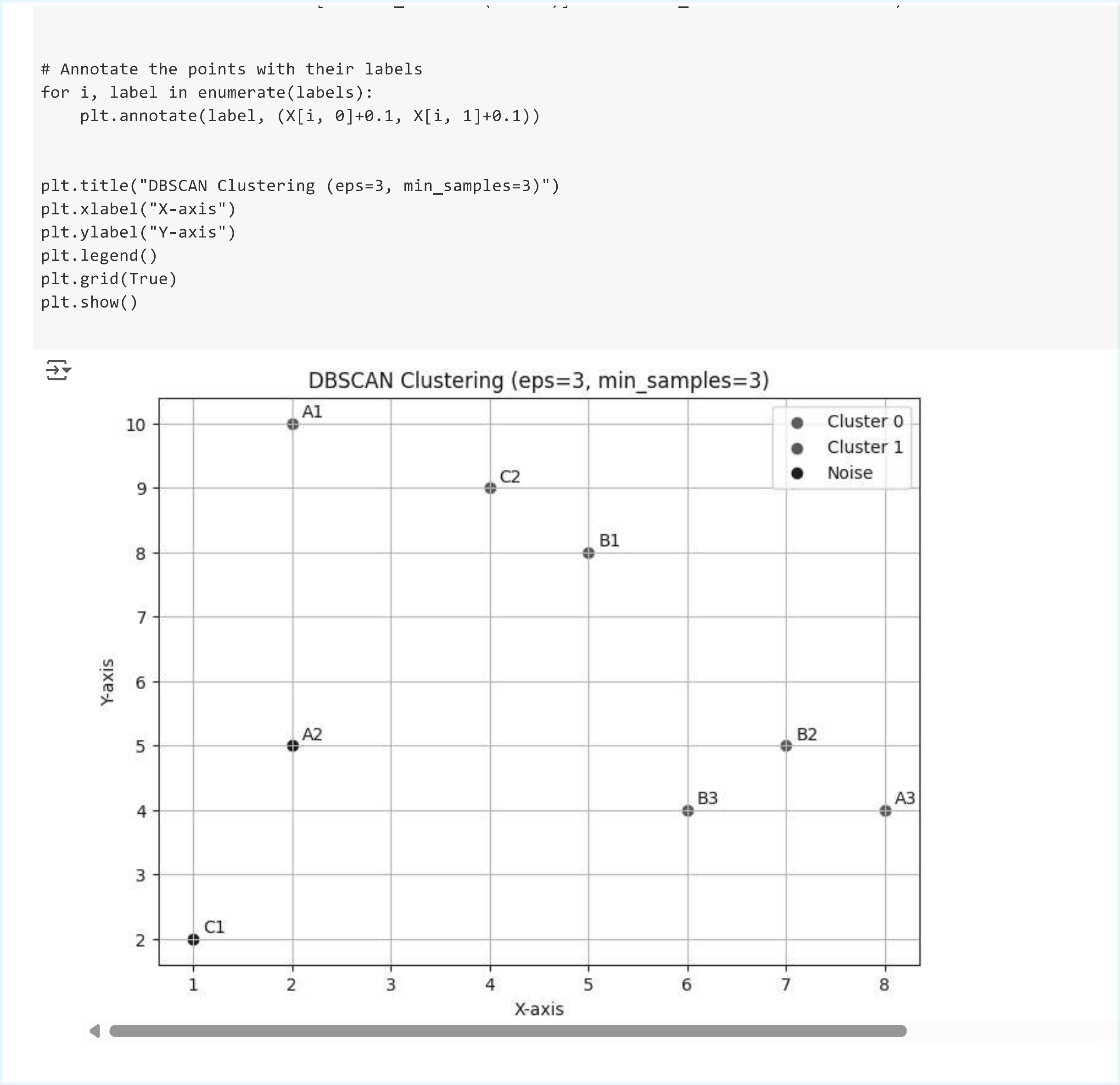
```
import numpy as np
from sklearn.cluster import KMeans


# Define the data points
data_points = np.array([
    [2, 10], [2, 5], [8, 4],
    [5, 8], [7, 5], [6, 4],
    [1, 2], [4, 9]
])


# Apply KMeans clustering with K=3
kmeans = KMeans(n_clusters=3, random_state=42)
kmeans.fit(data_points)


# Get the labels (which cluster each point belongs to) and centroids
labels = kmeans.labels_
centroids = kmeans.cluster_centers_


# Print the cluster labels for each data point
print("Cluster Labels:", labels)


# Print the centroids of the clusters
print("Centroids of the clusters:", centroids)


# Initialize a dictionary to store the clusters
clusters = {0: [], 1: [], 2: []}


# Organize data points into clusters
for i, label in enumerate(labels):
    clusters[label].append(tuple(data_points[i]))


# Print the clusters in the requested format
for i in range(3):
    print(f"Cluster {i+1}: {', '.join(map(str, clusters[i]))}")




#Code for viaualization


import matplotlib.pyplot as plt
plt.figure(figsize=(8, 6))


# Plot the data points with different colors for each cluster
for i in range(3):
    plt.scatter([data_points[j][0] for j in range(len(data_points)) if labels[j] == i],
                [data_points[j][1] for j in range(len(data_points)) if labels[j] == i],
                label=f"Cluster {i+1}")


# Plot the centroids
plt.scatter(centroids[:, 0], centroids[:, 1], c='red', marker='x', s=200, label="Centroids")


# Label the clusters
plt.title('K-Means Clustering (K=3) with Centroids')
plt.xlabel('X-axis')
plt.ylabel('Y-axis')
plt.legend()
```

```
Cluster Labels: [1 2 0 1 0 0 2 1]
Centroids of the clusters: [[7.         4.33333333]
 [3.66666667 9.        ]
 [1.5        3.5       ]]
Cluster 1: (np.int64(8), np.int64(4)), (np.int64(7), np.int64(5)), (np.int64(6), np.int64(4))
Cluster 2: (np.int64(2), np.int64(10)), (np.int64(5), np.int64(8)), (np.int64(4), np.int64(9))
Cluster 3: (np.int64(2), np.int64(5)), (np.int64(1), np.int64(2))
<matplotlib.legend.Legend at 0x7f6dd1e31f90>
```



```
import numpy as np
import matplotlib.pyplot as plt
from sklearn.cluster import DBSCAN


# Define the datapoints
points = {
    "A1": (2, 10),
    "A2": (2, 5),
    "A3": (8, 4),
    "B1": (5, 8),
    "B2": (7, 5),
    "B3": (6, 4),
    "C1": (1, 2),
    "C2": (4, 9)
}


# Extract coordinates and labels
labels = list(points.keys())
X = np.array(list(points.values()))


# Apply DBSCAN
dbscan = DBSCAN(eps=3, min_samples=3)
clusters = dbscan.fit_predict(X)


# Plotting the results
plt.figure(figsize=(8, 6))
unique_clusters = set(clusters)


colors = ['red', 'green', 'blue', 'orange', 'purple']
for cluster_id in unique_clusters:
    cluster_points = X[clusters == cluster_id]
    plt.scatter(cluster_points[:, 0], cluster_points[:, 1],
                label=f'Cluster {cluster_id}' if cluster_id != -1 else 'Noise',
                color=colors[cluster_id % len(colors)] if cluster_id != -1 else 'black')
```



```
# Annotate the points with their labels
for i, label in enumerate(labels):
    plt.annotate(label, (X[i, 0]+0.1, X[i, 1]+0.1))


plt.title("DBSCAN Clustering (eps=3, min_samples=3)")
plt.xlabel("X-axis")
plt.ylabel("Y-axis")
plt.legend()
plt.grid(True)
plt.show()
```