Agglomerative Clustering using single linkage and complete Linkage

In [1]:
```
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
from scipy.cluster.hierarchy import dendrogram, linkage
from sklearn.datasets import load_iris
```

In [2]:
```
# data = pd.read_csv("iris.csv")
iris = load_iris()
data = iris.data[:6]
data
```

Out[2]:
```
array([[5.1, 3.5, 1.4, 0.2],
       [4.9, 3. , 1.4, 0.2],
       [4.7, 3.2, 1.3, 0.2],
       [4.6, 3.1, 1.5, 0.2],
       [5. , 3.6, 1.4, 0.2],
       [5.4, 3.9, 1.7, 0.4]])
```

In [3]:
```
# Proximity Matrix

def proximity_matrix(data):
  n = data.shape[0]
  proximity_matrix = np.zeros((n, n))
  for i in range(n):
    for j in range(i+1, n):
        proximity_matrix[i, j] = np.linalg.norm(data[i] - data[j])
        proximity_matrix[j, i] = proximity_matrix[i, j]
  return proximity_matrix
```

In [4]:
```
# Plot Dendogram

def plot_dendrogram(data, method):
  linkage_matrix = linkage(data, method=method)
  dendrogram(linkage_matrix)
  plt.title(f'Dendrogram - {method} linkage')
  plt.xlabel('Data Points')
  plt.ylabel('Distance')
  plt.show()
```

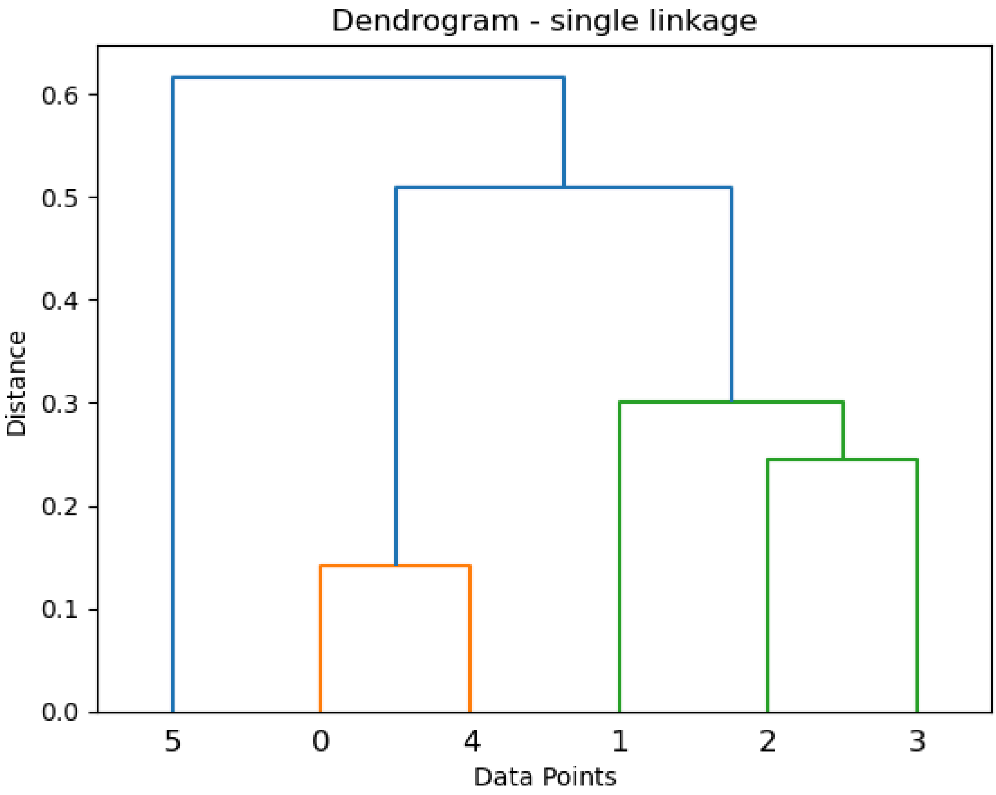
In [5]:

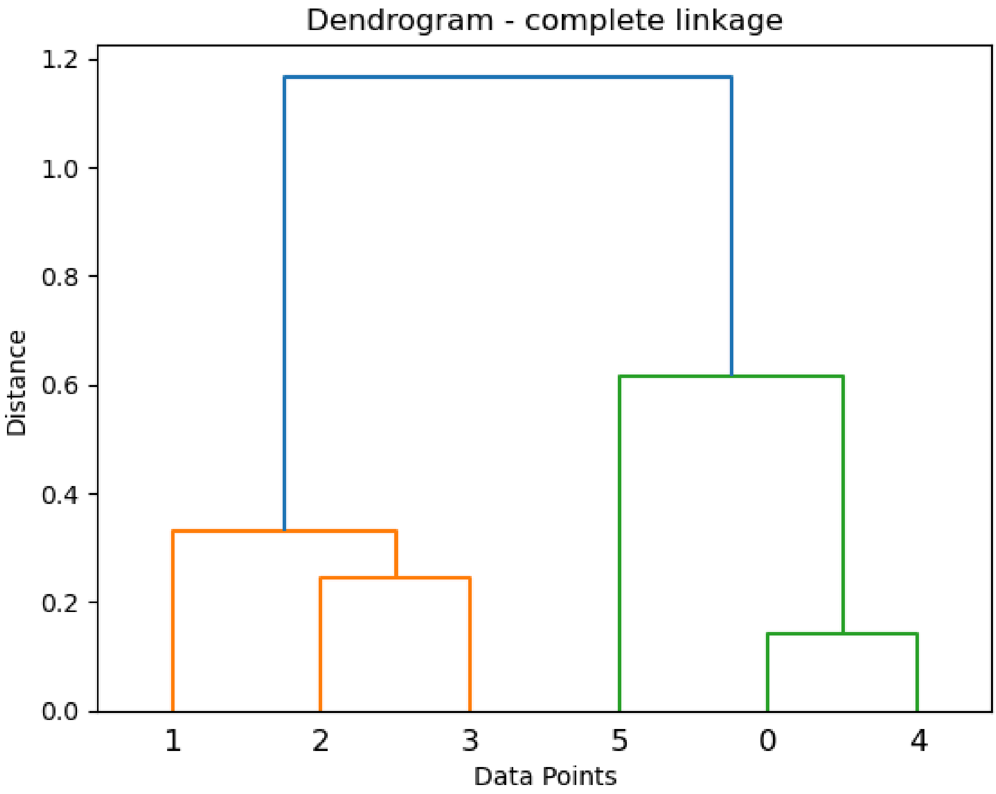
```
# Calculate the proximity matrix
print("Proximity matrix:")
print(proximity_matrix(data))

# Plot the dendrogram using single-linkage
plot_dendrogram(data, 'single')

# Plot the dendrogram using complete-linkage
plot_dendrogram(data, 'complete')
```

```
Proximity matrix:
[[0.         0.53851648 0.50990195 0.64807407 0.14142136 0.6164414 ]
 [0.53851648 0.         0.3        0.33166248 0.60827625 1.09087121]
 [0.50990195 0.3        0.         0.24494897 0.50990195 1.08627805]
 [0.64807407 0.33166248 0.24494897 0.         0.64807407 1.16619038]
 [0.14142136 0.60827625 0.50990195 0.64807407 0.         0.6164414 ]
 [0.6164414  1.09087121 1.08627805 1.16619038 0.6164414  0.        ]]
```


Dendrogram - single linkage
Distance
Data Points


Dendrogram - complete linkage
Distance
Data Points