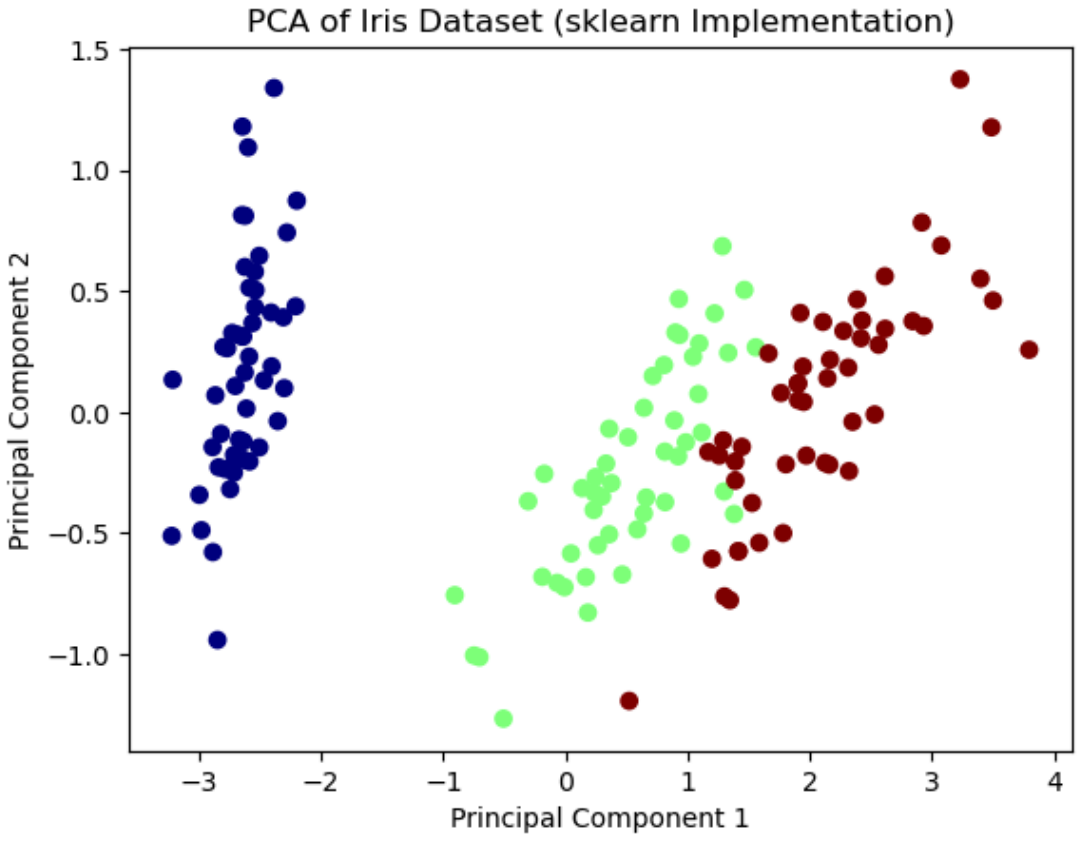
11a. PCA - Principal Component Analysis

In [1]:
```
import numpy as np
import matplotlib.pyplot as plt
from sklearn.datasets import load_iris
from sklearn.decomposition import PCA as SklearnPCA

# Load the Iris dataset
X = load_iris().data
y = load_iris().target

# Perform PCA using sklearn
pca = SklearnPCA(n_components=2)
X_projected = pca.fit_transform(X)

print("Shape of Data:", X.shape)
print("Shape of transformed Data:", X_projected.shape)

# Plot the results
pc1 = X_projected[:, 0]
pc2 = X_projected[:, 1]

plt.scatter(pc1, pc2, c=y, cmap="jet")
plt.xlabel("Principal Component 1")
plt.ylabel("Principal Component 2")
plt.title("PCA of Iris Dataset (sklearn Implementation)")
plt.show()
```

```
Shape of Data: (150, 4)
Shape of transformed Data: (150, 2)
```



11b. LDA - Linear Discriminant Analysis

In [2]:
```
import numpy as np
import matplotlib.pyplot as plt
from sklearn.datasets import load_iris
from sklearn.discriminant_analysis import LinearDiscriminantAnalysis

# Load the Iris dataset
X = load_iris().data
y = load_iris().target

# Perform LDA using sklearn
lda = LinearDiscriminantAnalysis(n_components=2)
X_projected = lda.fit_transform(X, y)

print("Shape of Data:", X.shape)
print("Shape of transformed Data:", X_projected.shape)

# Plot the results
ld1 = X_projected[:, 0]
ld2 = X_projected[:, 1]

plt.scatter(ld1, ld2, c=y, cmap="jet")
plt.xlabel("Linear Discriminant 1")
plt.ylabel("Linear Discriminant 2")
plt.title("LDA of Iris Dataset (sklearn Implementation)")
plt.show()
```

```
Shape of Data: (150, 4)
Shape of transformed Data: (150, 2)
```