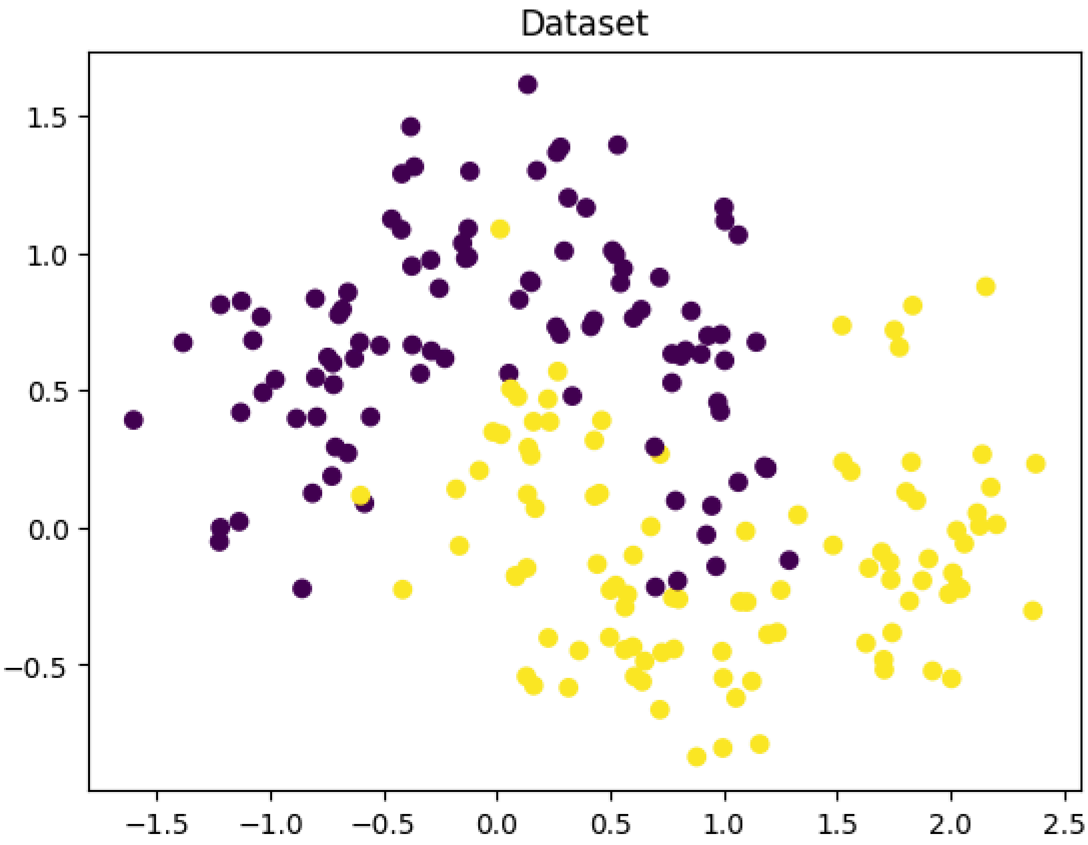
benhur dabre ## roll-12 ## b-1

In [10]:

```
import numpy as np
import matplotlib.pyplot as plt

from sklearn.datasets import make_moons
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.metrics import accuracy_score, confusion_matrix

X, y = make_moons(n_samples=200, noise=0.25, random_state=42)

plt.scatter(X[:, 0], X[:, 1], c=y, cmap="viridis")
plt.title("Dataset")
plt.show()
```



In [14]:

```
X_train, X_test, y_train, y_test = train_test_split(
    X, y, test_size=0.3, random_state=0
)

scaler = StandardScaler()
X_train_scaled = scaler.fit_transform(X_train)
X_test_scaled = scaler.transform(X_test)
```

In [19]:

```
from sklearn.linear_model import LogisticRegression
```

```
lr = LogisticRegression()
lr.fit(X_train_scaled, y_train)

y_pred_lr = lr.predict(X_test_scaled)

print("Logistic Regression")
print("Accuracy:", accuracy_score(y_test, y_pred_lr))
print("Confusion Matrix:\n", confusion_matrix(y_test, y_pred_lr))
```

```
Logistic Regression
Accuracy: 0.85
Confusion Matrix:
 [[25  7]
 [ 2 26]]
```

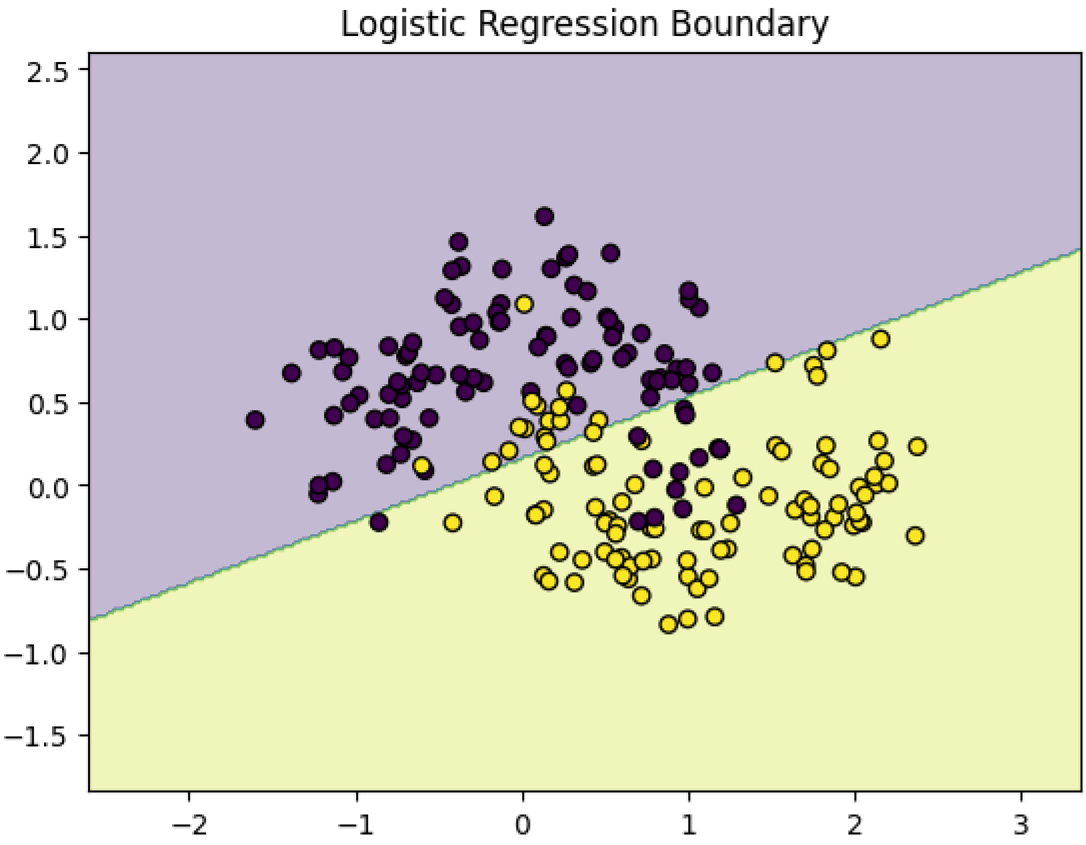
In [23]:

```
from sklearn.neighbors import KNeighborsClassifier

knn = KNeighborsClassifier(n_neighbors=5)
knn.fit(X_train_scaled, y_train)

y_pred_knn = knn.predict(X_test_scaled)

print("KNN")
print("Accuracy:", accuracy_score(y_test, y_pred_knn))
print("Confusion Matrix:\n", confusion_matrix(y_test, y_pred_knn))
```

```
KNN
Accuracy: 0.9
Confusion Matrix:
 [[27  5]
 [ 1 27]]
```

In [27]:

```
def plot_boundary(model, scaled, title):
    h = 0.02

    x_min, x_max = X[:, 0].min() - 1, X[:, 0].max() + 1
    y_min, y_max = X[:, 1].min() - 1, X[:, 1].max() + 1

    xx, yy = np.meshgrid(
        np.arange(x_min, x_max, h),
        np.arange(y_min, y_max, h)
    )

    grid = np.c_[xx.ravel(), yy.ravel()]

    if scaled:
        grid = scaler.transform(grid)

    Z = model.predict(grid)
    Z = Z.reshape(xx.shape)

    plt.contourf(xx, yy, Z, alpha=0.3, cmap="viridis")
    plt.scatter(X[:, 0], X[:, 1], c=y, cmap="viridis", edgecolor="k")
    plt.title(title)
    plt.show()

plot_boundary(lr, True, "Logistic Regression Boundary")
plot_boundary(dt, True, "Decision Tree Boundary")
plot_boundary(knn, True, "knn Boundary")
```


Logistic Regression Boundary