In [3]:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler, LabelEncoder
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import accuracy_score, confusion_matrix, precision_score,
```

In [4]:

```
df = pd.read_csv('Social_Network_Ads.csv')
print(df.head())
```

```
    User ID  Gender  Age  EstimatedSalary  Purchased
0  15624510    Male   19            19000          0
1  15810944    Male   35            20000          0
2  15668575  Female   26            43000          0
3  15603246  Female   27            57000          0
4  15804002    Male   19            76000          0
```

In [5]:

```
print("\nNull Values in Dataset:")
print(df.isnull().sum())
```

```
Null Values in Dataset:
User ID            0
Gender             0
Age                0
EstimatedSalary    0
Purchased          0
dtype: int64
```

In [6]:

```
if 'Gender' in df.columns:
    label_encoder = LabelEncoder()
    df['Gender'] = label_encoder.fit_transform(df['Gender'])  # Encode Male=1,
```

In [7]:

```
selected_features = ['Age', 'EstimatedSalary', 'Gender']
X = df[selected_features]  # Independent variables
y = df['Purchased']  # Target variable (1 = Purchased, 0 = Not Purchased)
```

In [8]:

```
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, rando
```

In [9]:

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

In [10]:

```
logreg = LogisticRegression()
logreg.fit(X_train, y_train)
```

Out[10]:

```
LogisticRegression()
```

In a Jupyter environment, please rerun this cell to show the HTML representation or trust the notebook.
On GitHub, the HTML representation is unable to render, please try loading this page with nbviewer.org.

In [11]:

```
y_pred = logreg.predict(X_test)
```

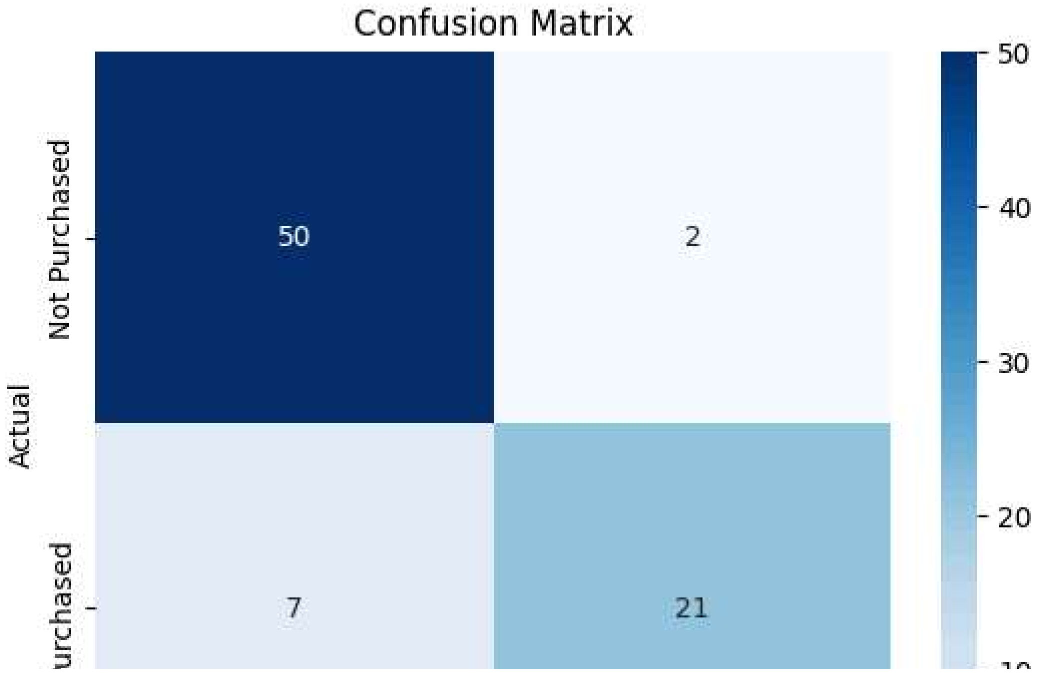
In [12]:

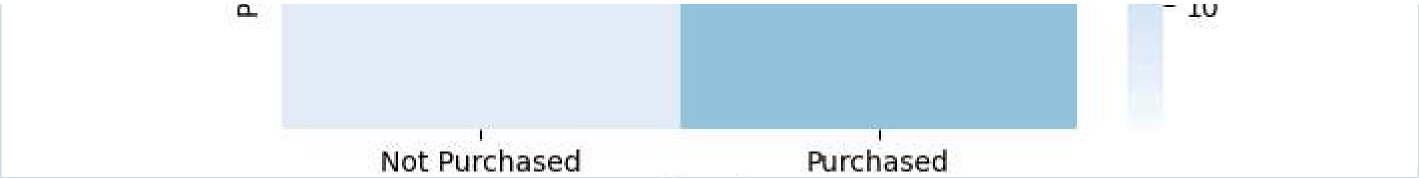
```
accuracy = accuracy_score(y_test, y_pred)
precision = precision_score(y_test, y_pred)
recall = recall_score(y_test, y_pred)
cm = confusion_matrix(y_test, y_pred)

print(f"\nAccuracy: {accuracy:.2f}")
print(f"Precision: {precision:.2f}")
print(f"Recall: {recall:.2f}")
print("\nConfusion Matrix:")
print(cm)
```

```
Accuracy: 0.89
Precision: 0.91
Recall: 0.75

Confusion Matrix:
[[50  2]
 [ 7 21]]
```

In [18]:

```
sns.heatmap(cm, annot=True, fmt='d', cmap='Blues', xticklabels=['Not Purchasec
plt.xlabel('Predicted')
plt.ylabel('Actual')
plt.title('Confusion Matrix')
plt.show()
```




10
Not Purchased
Purchased