In [1]:
```
# Import necessary libraries
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.datasets import load_diabetes
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import accuracy_score, classification_report, confusion_m
atrix, roc_curve, auc
```

In [2]:
```
# Load the diabetes dataset
diabetes = load_diabetes()
X, y = diabetes.data, diabetes.target

# Convert the target variable to binary (1 for diabetes, 0 for no diabetes)
y_binary = (y > np.median(y)).astype(int)
```

In [3]:
```
# Split the data into training and testing sets
X_train, X_test, y_train, y_test = train_test_split(
        X, y_binary, test_size=0.2, random_state=42)
```

In [4]:
```
# Standardize features
scaler = StandardScaler()
X_train = scaler.fit_transform(X_train)
X_test = scaler.transform(X_test)
```

In [5]:
```
# Train the Logistic Regression model
model = LogisticRegression()
model.fit(X_train, y_train)
```

Out[5]:
```
LogisticRegression(C=1.0, class_weight=None, dual=False, fit_intercept=True,
          intercept_scaling=1, max_iter=100, multi_class='ovr', n_jobs=1,
          penalty='l2', random_state=None, solver='liblinear', tol=0.0001,
          verbose=0, warm_start=False)
```

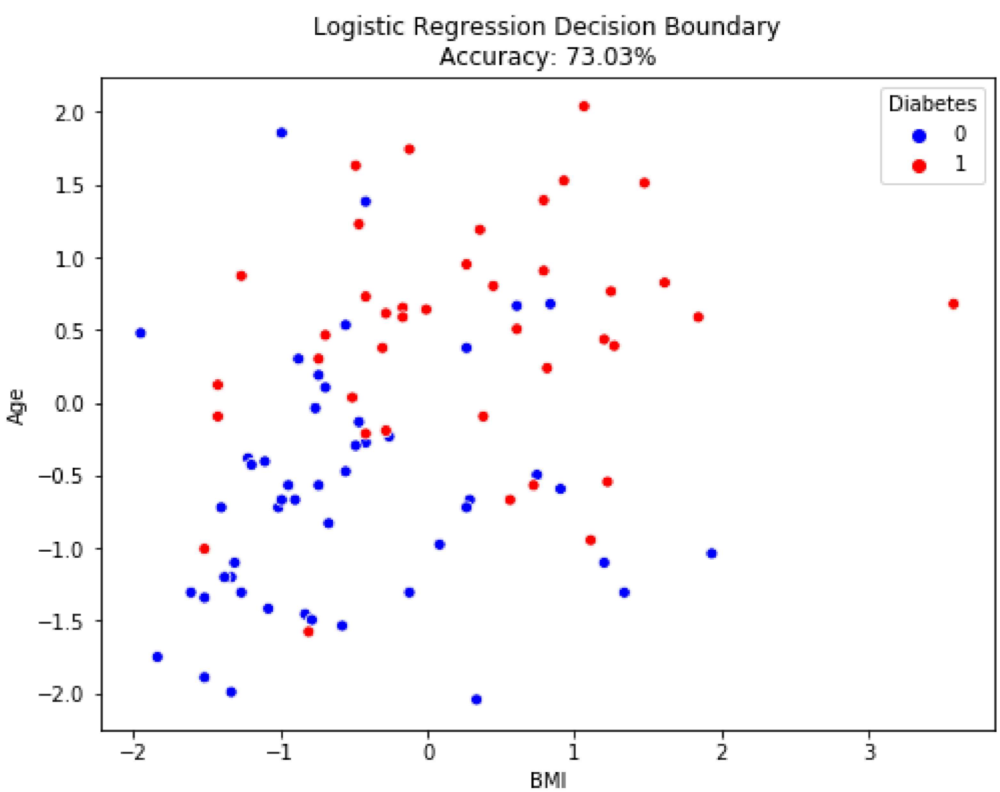
In [6]:
```
# Evaluate the model
y_pred = model.predict(X_test)
accuracy = accuracy_score(y_test, y_pred)
print("Accuracy: {:.2f}%".format(accuracy * 100))
```

```
Accuracy: 73.03%
```

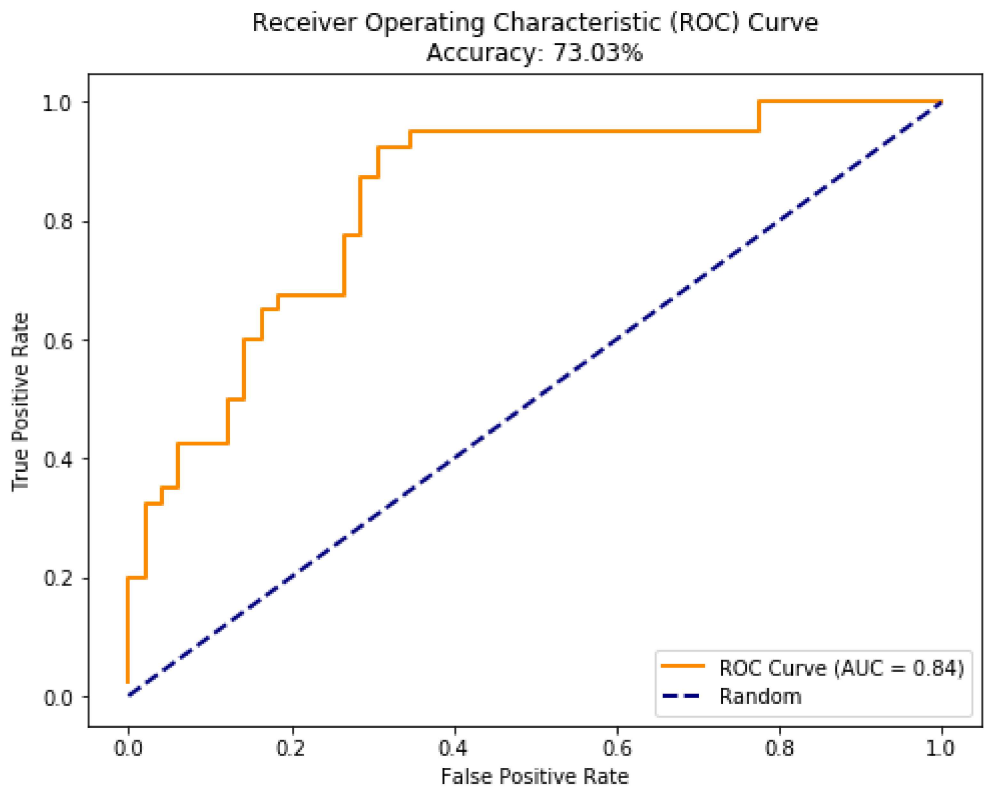
In [7]:
```
# evaluate the model
print("Confusion Matrix:\n", confusion_matrix(y_test, y_pred))
print("\nClassification Report:\n", classification_report(y_test, y_pred))
```

```
Confusion Matrix:
 [[36 13]
 [11 29]]

Classification Report:
              precision    recall  f1-score   support

          0       0.77      0.73      0.75        49
          1       0.69      0.72      0.71        40

avg / total       0.73      0.73      0.73        89
```

In [8]:
```
# Visualize the decision boundary with accuracy information
plt.figure(figsize=(8, 6))
sns.scatterplot(x=X_test[:, 2], y=X_test[:, 8], hue=y_test, palette={
                                0: 'blue', 1: 'red'}, marker='o')
plt.xlabel("BMI")
plt.ylabel("Age")
plt.title("Logistic Regression Decision Boundary\nAccuracy: {:.2f}%".format(
        accuracy * 100))
plt.legend(title="Diabetes", loc="upper right")
plt.show()
```



In [9]:
```
# Plot ROC Curve
y_prob = model.predict_proba(X_test)[:, 1]
fpr, tpr, thresholds = roc_curve(y_test, y_prob)
roc_auc = auc(fpr, tpr)

plt.figure(figsize=(8, 6))
plt.plot(fpr, tpr, color='darkorange', lw=2,
                label=f'ROC Curve (AUC = {roc_auc:.2f})')
plt.plot([0, 1], [0, 1], color='navy', lw=2, linestyle='--', label='Random')
plt.xlabel('False Positive Rate')
plt.ylabel('True Positive Rate')
plt.title('Receiver Operating Characteristic (ROC) Curve\nAccuracy: {:.2f}%'.f
ormat(
        accuracy * 100))
plt.legend(loc="lower right")
plt.show()
```



In [ ]: