```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns

from sklearn.model_selection import train_test_split
from sklearn.preprocessing import LabelEncoder
from sklearn.tree import DecisionTreeClassifier, plot_tree
from sklearn.metrics import classification_report, accuracy_score,
confusion_matrix, ConfusionMatrixDisplay

df = pd.read_csv("bank.csv", sep=';')


print(df.head())
print(df.info())
print(df.describe())
print(df['y'].value_counts())

le = LabelEncoder()
for col in df.select_dtypes(include='object').columns:
    df[col] = le.fit_transform(df[col])

print("Null counts:\n", df.isnull().sum())

X = df.drop('y', axis=1)
y = df['y']

X_train, X_test, y_train, y_test = train_test_split(
    X, y, test_size=0.2, random_state=42)


dt_model = DecisionTreeClassifier(random_state=42)
dt_model.fit(X_train, y_train)


y_pred = dt_model.predict(X_test)
print("Accuracy:", accuracy_score(y_test, y_pred))
print("Classification Report:\n", classification_report(y_test, y_pred))


cm = confusion_matrix(y_test, y_pred)
ConfusionMatrixDisplay(cm).plot()
plt.title("Confusion Matrix")
plt.show()


plt.figure(figsize=(14, 10))
_ = plot_tree(
```

```
    dt_model,
    feature_names=X.columns,
    class_names=['No', 'Yes'],
    filled=True,
    rounded=True,
    max_depth=3,
    fontsize=10
)
plt.title("Simplified Decision Tree (max_depth=3)")
plt.show()
```