NAME: ONKAR JAMMA

ROLL NO: 21

PRACTICAL: 5

```python
import pandas as pd
from sklearn.datasets import load_wine
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_squared_error, r2_score

# Load the Wine dataset
wine = load_wine()
X = pd.DataFrame(wine.data, columns=wine.feature_names)
y = wine.target

# Split the data into training and testing sets (80% training, 20% testing)
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)

# Instantiate the Linear Regression model
model = LinearRegression()

# Train the model on the training set
model.fit(X_train, y_train)

# Make predictions on the testing set
y_pred = model.predict(X_test)

# Evaluate the model
mse = mean_squared_error(y_test, y_pred)
r2 = r2_score(y_test, y_pred)

# Display the evaluation metrics
print("Wine Dataset:")
print(f"Mean Squared Error (MSE): {mse:.4f}")
print(f"R-squared (R2): {r2:.4f}")

# Display the coefficients for each feature
coefficients = pd.DataFrame({'Feature': X.columns, 'Coefficient': model.coef_})
```

```
print("\nCoefficients:")
print(coefficients)
```

```
Wine Dataset:
Mean Squared Error (MSE): 0.0685
R-squared (R2): 0.8825

Coefficients:
                        Feature  Coefficient
0                       alcohol    -0.109280
1                    malic_acid     0.043350
2                           ash    -0.204973
3              alcalinity_of_ash     0.044028
4                     magnesium     0.000038
5                 total_phenols     0.152212
6                     flavanoids    -0.353372
7           nonflavanoid_phenols    -0.320201
8                proanthocyanins     0.017596
9                color_intensity     0.076823
10                          hue    -0.091345
11   od280/od315_of_diluted_wines    -0.281543
12                       proline    -0.000697
```