```python
import pandas as pd
from sklearn import preprocessing
from sklearn.datasets import load_iris

iris = load_iris()
df = pd.DataFrame(iris.data, columns=iris.feature_names)
df['Species'] = pd.Categorical.from_codes(iris.target, iris.target_names)

print("Iris Dataset:")
print(df.head())
```

```
Iris Dataset:
   sepal length (cm)  sepal width (cm)  petal length (cm)  petal width
(cm)  \
0                5.1               3.5                1.4               0.2
1                4.9               3.0                1.4               0.2
2                4.7               3.2                1.3               0.2
3                4.6               3.1                1.5               0.2
4                5.0               3.6                1.4               0.2

  Species
0  setosa
1  setosa
2  setosa
3  setosa
4  setosa
```

```python
min_max_scaler = preprocessing.MinMaxScaler()

x = df.iloc[:, :-1]

x_scaled = min_max_scaler.fit_transform(x)

df_normalized = pd.DataFrame(x_scaled, columns=iris.feature_names)

print("\nNormalized Iris Dataset:")
print(df_normalized)
```

```
Normalized Iris Dataset:
     sepal length (cm)  sepal width (cm)  petal length (cm)  petal width (cm)
0             0.222222          0.625000           0.067797          0.041667
1             0.166667          0.416667           0.067797          0.041667
2             0.111111          0.500000           0.050847          0.041667
3             0.083333          0.458333           0.084746          0.041667
4             0.194444          0.666667           0.067797          0.041667
..                 ...               ...                ...               ...
145           0.666667          0.416667           0.711864          0.916667
146           0.555556          0.208333           0.677966          0.750000
147           0.611111          0.416667           0.711864          0.791667
148           0.527778          0.583333           0.745763          0.916667
149           0.444444          0.416667           0.694915          0.708333
```

```
[150 rows x 4 columns]
```

```
print("\nUnique values in Species column before Label Encoding:")
print(df['Species'].unique())
```

```
Unique values in Species column before Label Encoding:
['setosa', 'versicolor', 'virginica']
Categories (3, object): ['setosa', 'versicolor', 'virginica']
```

```
label_encoder = preprocessing.LabelEncoder()

df['Species'] = label_encoder.fit_transform(df['Species'])
print("\nUnique values in Species column after Label Encoding:")
print(df['Species'].unique())
```

```
Unique values in Species column after Label Encoding:
[0 1 2]
```

```
print("\nUnique values in Species column for One-Hot Encoding:")
print(df['Species'].unique())
features_df = df.drop(columns=['Species'])
enc = preprocessing.OneHotEncoder(sparse_output=False)
enc_df = pd.DataFrame(enc.fit_transform(df[['Species']]))
df_encoded = features_df.join(enc_df)
df_encoded.rename(columns={0: 'Iris-Setosa', 1: 'Iris-Versicolor', 2: 'Iris-
Virginica'}, inplace=True)
print("\nOne-Hot Encoded Iris Dataset:")
print(df_encoded)
```

```
Unique values in Species column for One-Hot Encoding:
[0 1 2]

One-Hot Encoded Iris Dataset:
     sepal length (cm)  sepal width (cm)  petal length (cm)  petal width (cm)
\
0                  5.1               3.5                1.4               0.2
1                  4.9               3.0                1.4               0.2
2                  4.7               3.2                1.3               0.2
3                  4.6               3.1                1.5               0.2
4                  5.0               3.6                1.4               0.2
..                 ...               ...                ...               ...
145                6.7               3.0                5.2               2.3
146                6.3               2.5                5.0               1.9
147                6.5               3.0                5.2               2.0
148                6.2               3.4                5.4               2.3
149                5.9               3.0                5.1               1.8
```

```
     Iris-Setosa  Iris-Versicolor  Iris-Virginica
0            1.0              0.0             0.0
1            1.0              0.0             0.0
2            1.0              0.0             0.0
3            1.0              0.0             0.0
4            1.0              0.0             0.0
..           ...              ...             ...
145          0.0              0.0             1.0
146          0.0              0.0             1.0
147          0.0              0.0             1.0
148          0.0              0.0             1.0
149          0.0              0.0             1.0

[150 rows x 7 columns]
```

```
df_dummy_encoded = pd.get_dummies(df, drop_first=True)

print("\nDummy Encoded Iris Dataset:")
print(df_dummy_encoded)
```

```
Dummy Encoded Iris Dataset:
     sepal length (cm)  sepal width (cm)  petal length (cm)  petal width (cm)
\
0                  5.1               3.5                1.4               0.2
1                  4.9               3.0                1.4               0.2
2                  4.7               3.2                1.3               0.2
3                  4.6               3.1                1.5               0.2
4                  5.0               3.6                1.4               0.2
..                 ...               ...                ...               ...
145                6.7               3.0                5.2               2.3
146                6.3               2.5                5.0               1.9
147                6.5               3.0                5.2               2.0
148                6.2               3.4                5.4               2.3
149                5.9               3.0                5.1               1.8

     Species
0          0
1          0
2          0
3          0
4          0
..       ...
145        2
146        2
147        2
148        2
149        2

[150 rows x 5 columns]
```