

## Q9

```
In [ ]: import pandas as pd
        from sklearn.linear_model import LogisticRegression
        from sklearn.model_selection import train_test_split
        from sklearn.metrics import confusion_matrix, classification_report
        from sklearn.datasets import load_iris
```

### Load Data

```
In [ ]: iris = load_iris(as_frame=True)
        X = iris["data"]
        y = iris["target"]
```

### Splitting data

```
In [ ]: X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)
```

### Training model

```
In [ ]: logReg = LogisticRegression()
        logReg.fit(X_train, y_train)

        logReg.predict_proba(X_test)
```

```
Out[ ]: array([[1.72598811e-05, 4.90291644e-02, 9.50953576e-01],
               [9.69214414e-01, 3.07854618e-02, 1.24183591e-07],
               [7.50624085e-09, 1.62768540e-03, 9.98372307e-01],
               [9.82927219e-01, 1.70727393e-02, 4.21211089e-08],
               [7.15478659e-04, 4.25835699e-01, 5.73448822e-01],
               [7.18446986e-07, 1.64090909e-02, 9.83590191e-01],
               [9.85298821e-01, 1.47011559e-02, 2.35223546e-08],
               [9.64044750e-01, 3.59551647e-02, 8.52166111e-08],
               [7.83270592e-05, 1.42220683e-01, 8.57700990e-01],
               [9.66368158e-01, 3.36317326e-02, 1.09810718e-07],
               [9.82411080e-01, 1.75888853e-02, 3.47154490e-08],
               [7.66166173e-05, 7.14842482e-02, 9.28439135e-01],
               [9.61534401e-01, 3.84653649e-02, 2.33560855e-07],
               [9.71162735e-01, 2.88372120e-02, 5.27061771e-08],
               [8.16888878e-05, 1.04016764e-01, 8.95901547e-01],
               [9.14086083e-03, 9.27237076e-01, 6.36220634e-02],
               [9.83601240e-03, 9.73039428e-01, 1.71245596e-02],
               [6.90673755e-04, 4.94946398e-01, 5.04362928e-01],
               [6.40120032e-08, 6.50415317e-03, 9.93495783e-01],
               [3.21021679e-05, 8.23861355e-02, 9.17581762e-01],
               [7.51176227e-06, 6.01994490e-02, 9.39793039e-01],
               [9.55549701e-01, 4.44501372e-02, 1.61797376e-07],
               [2.99934586e-04, 2.92468479e-01, 7.07231586e-01],
               [9.64060645e-01, 3.59391950e-02, 1.60373489e-07],
               [2.48009786e-02, 9.55663962e-01, 1.95350595e-02],
               [6.05370394e-04, 2.63945058e-01, 7.35449572e-01],
               [5.53391900e-03, 9.11003802e-01, 8.34622789e-02],
               [9.35689796e-01, 6.43099620e-02, 2.42434932e-07],
               [3.45452200e-03, 8.48057454e-01, 1.48488024e-01],
               [9.16733722e-06, 3.24799711e-02, 9.67510862e-01]])
```

## Predictions and metrics

```
In [ ]: preds = logReg.predict(X_test)

print("Confusion Matrix")
confusion_matrix(y_test, preds)
```

Confusion Matrix

```
Out[ ]: array([[11,  0,  0],
               [ 0,  5,  1],
               [ 0,  0, 13]], dtype=int64)
```

```
In [ ]: print(classification_report(y_test, preds))
```

	precision	recall	f1-score	support
0	1.00	1.00	1.00	11
1	1.00	0.83	0.91	6
2	0.93	1.00	0.96	13
accuracy			0.97	30
macro avg	0.98	0.94	0.96	30
weighted avg	0.97	0.97	0.97	30

