Assignment No. 10

import numpy as np

from sklearn.neural\_network import MLPClassifier

from sklearn.model\_selection import train\_test\_split

from sklearn.metrics import accuracy\_score

# Define the input data for XOR logic gate

# Input features: [x1, x2]

X = np.array([[0, 0],

[0, 1],

[1, 0],

[1, 1]])

# Output labels for XOR logic gate

# Output: y = x1 XOR x2

y = np.array([0, 1, 1, 0])

# Split the dataset into training and testing sets

X\_train, X\_test, y\_train, y\_test = train\_test\_split(X, y, test\_size=0.25, random\_state=42)

# Create a Multilayer Perceptron classifier

# The hidden layer has 2 neurons

mlp = MLPClassifier(hidden\_layer\_sizes=(2,), activation='relu', max\_iter=1000, random\_state=42)

# Train the model

mlp.fit(X\_train, y\_train)

# Make predictions on the test set

y\_pred = mlp.predict(X\_test)

# Evaluate the model's performance

accuracy = accuracy\_score(y\_test, y\_pred)

print("Predictions:", y\_pred)

print("Accuracy:", accuracy)

# Testing with all inputs to visualize results

for input\_data in X:

print(f"Input: {input\_data}, Predicted Output: {mlp.predict([input\_data])[0]}")

#OUTPUT

Predictions: [0]

Accuracy: 0.0

Input: [0 0], Predicted Output: 0

Input: [0 1], Predicted Output: 0

Input: [1 0], Predicted Output: 0

Input: [1 1], Predicted Output: 0