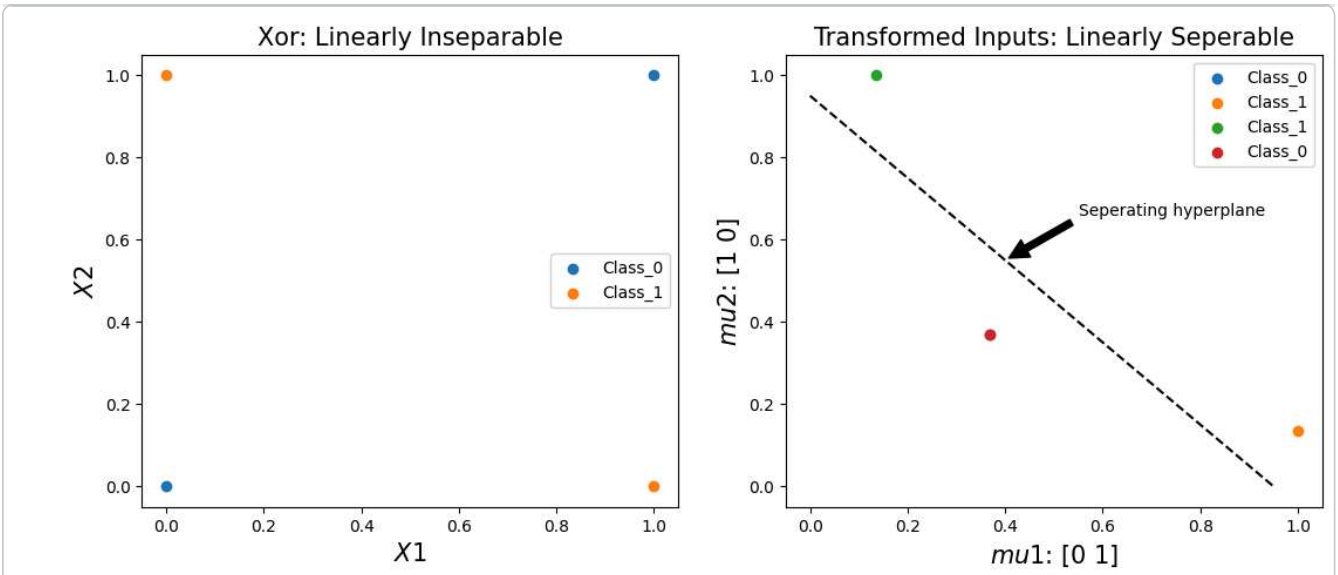
```
import numpy as np
import matplotlib.pyplot as plt

def gaussian_rbf(x, landmark, gamma=1):
    return np.exp(-gamma * np.linalg.norm(x - landmark)**2)

def end_to_end(X1, X2, ys, mu1, mu2):
    from_1 = [gaussian_rbf(i, mu1) for i in zip(X1, X2)]
    from_2 = [gaussian_rbf(i, mu2) for i in zip(X1, X2)]

    plt.figure(figsize=(13, 5))
    plt.subplot(1, 2, 1)
    plt.scatter((X1[0], X1[3]), (X2[0], X2[3]), label="Class_0")
    plt.scatter((X1[1], X1[2]), (X2[1], X2[2]), label="Class_1")
    plt.xlabel("$X1$", fontsize=15)
    plt.ylabel("$X2$", fontsize=15)
    plt.title("Xor: Linearly Inseparable", fontsize=15)
    plt.legend()
    plt.subplot(1, 2, 2)
    plt.scatter(from_1[0], from_2[0], label="Class_0")
    plt.scatter(from_1[1], from_2[1], label="Class_1")
    plt.scatter(from_1[2], from_2[2], label="Class_1")
    plt.scatter(from_1[3], from_2[3], label="Class_0")

    plt.plot([0, 0.95], [0.95, 0], "k--")

    plt.annotate("Seperating hyperplane", xy=(0.4, 0.55), xytext=(0.55, 0.66),
                arrowprops=dict(facecolor='black', shrink=0.05))

    plt.xlabel(f"$mu1$: {(mu1)}", fontsize=15)
    plt.ylabel(f"$mu2$: {(mu2)}", fontsize=15)
    plt.title("Transformed Inputs: Linearly Seperable", fontsize=15)
    plt.legend()
    plt.show()

    A = []

    for i, j in zip(from_1, from_2):
        temp = []
        temp.append(i)
        temp.append(j)
        temp.append(1)
        A.append(temp)

    A = np.array(A)

    W = np.linalg.inv(A.T.dot(A)).dot(A.T).dot(ys)

    print(np.round(A.dot(W)))
    print(ys)
    print(f"Weights: {W}")

    return W
def predict_matrix(point, weights):
    gaussian_rbf_0 = gaussian_rbf(np.array(point), mu1)
    gaussian_rbf_1 = gaussian_rbf(np.array(point), mu2)
    A = np.array([gaussian_rbf_0, gaussian_rbf_1, 1])
    return np.round(A.dot(weights))
# points
x1 = np.array([0, 0, 1, 1])
x2 = np.array([0, 1, 0, 1])
ys = np.array([0, 1, 1, 0])

# centers
mu1 = np.array([0, 1])
mu2 = np.array([1, 0])
w = end_to_end(x1, x2, ys, mu1, mu2)

# testing
print(f"Input:{np.array([0, 0])}, Predicted: {predict_matrix(np.array([0, 0]), w)}")
print(f"Input:{np.array([0, 1])}, Predicted: {predict_matrix(np.array([0, 1]), w)}")
print(f"Input:{np.array([1, 0])}, Predicted: {predict_matrix(np.array([1, 0]), w)}")
print(f"Input:{np.array([1, 1])}, Predicted: {predict_matrix(np.array([1, 1]), w)}")
```




```
[0. 1. 1. 0.]
[0 1 1 0]
Weights: [ 2.5026503   2.5026503  -1.84134719]
Input:[0 0], Predicted: 0.0
Input:[0 1], Predicted: 1.0
Input:[1 0], Predicted: 1.0
Input:[1 1], Predicted: 0.0
```