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#import lib
import numpy as np

#def two pairs of vectors
x1= np.array([1,1,1,-1])
y1= np.array([1,-1])

x2= np.array([-1,-1,1,1])
y2= np.array([-1, 1])

#compute the weight matrix
W= np.outer(y1, x1) + np.outer(y2,x2)

W_T= W.T #transpose for bidirectional mapping

#def bam function
def bam_x_to_y(x):
    y = np.dot(W, x)
    return np.where(y >= 0, 1, -1)

def bam_y_to_x(y):
    x = np.dot(W_T, y)
    return np.where(x >= 0, 1, -1)

# test BAM with inputs
x_test = np.array([1, -1, -1, -1])

y_test = bam_x_to_y(x_test)
x_reconstructed = bam_y_to_x(y_test)

# print output
print("Input x:", x_test)
print("Output y:", y_test)
print("Reconstructed x:", x_reconstructed)

Input x: [ 1 -1 -1 -1]
Output y: [ 1 -1]
Reconstructed x: [ 1  1  1 -1]

```