**Computational Intelligence *third* assignment**

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* 1. First point is that when we save an input into Hopfield network, the reverse of that input also saves into network. So, for saving this list: [ (1,1,1,1) , (-1,-1,-1,-1) , (1,1,-1,-1) , (-1,-1,1,1) ] , we only need to save (1,1,1,1) and (1,1,-1,-1), the others will save automatically and we don’t need to add them.

Therefore, answer is **YES**, we can save them all.

Here is calculation of weights matrix:

**Apply (1,1,1,1)**

|  |  |  |  |
| --- | --- | --- | --- |
| **X** | **0** | **0** | **0** |
| **0** | **X** | **0** | **0** |
| **0** | **0** | **X** | **0** |
| **0** | **0** | **0** | **X** |

|  |  |  |  |
| --- | --- | --- | --- |
| **X** | **1** | **1** | **1** |
| **1** | **X** | **1** | **1** |
| **1** | **1** | **X** | **1** |
| **1** | **1** | **1** | **X** |

|  |  |  |  |
| --- | --- | --- | --- |
| **X** | **1** | **1** | **1** |
| **1** | **X** | **1** | **1** |
| **1** | **1** | **X** | **1** |
| **1** | **1** | **1** | **X** |

|  |  |  |  |
| --- | --- | --- | --- |
| **X** | **2** | **0** | **0** |
| **2** | **X** | **0** | **0** |
| **0** | **0** | **X** | **2** |
| **0** | **0** | **2** | **X** |

**Apply (1,1,-1,-1)**

in the next page I’m going to test network and find energy of each input to see if it is stable or not.

(1,1,1,1) --> 0 + 2 + 0 + 0 = 2 🡺 1  
2 + 0 + 0 + 0 = 2 🡺 1  
0 + 0 + 0 + 2 = 2 🡺 1

**STABLE**

0 + 0 + 2 + 0 = 2 🡺 1(-1,-1,-1,-1) --> 0 -2 + 0 + 0 = -2 🡺 -1  
-2 + 0 + 0 + 0 = -2 🡺 -1  
0 + 0 + 0 -2 = -2 🡺 -1

**STABLE**

0 + 0 -2 + 0 = -2 🡺 -1

(1,1,-1,-1) --> 0 + 2 + 0 + 0 = 2 🡺 1  
2 + 0 + 0 + 0 = 2 🡺 1  
0 + 0 + 0 -2 = -2 🡺 -1

**STABLE**

0 + 0 -2 + 0 = -2 🡺 -1

(-1,-1,1,1) --> 0 + 2 + 0 + 0 = -2 🡺 -1  
-2 + 0 + 0 + 0 = -2 🡺 -1  
0 + 0 + 0 + 2 = 2 🡺 1

**STABLE**

0 + 0 + 2 + 0 = 2 🡺 1All of them are stable, so we are finished.

**1.2)**