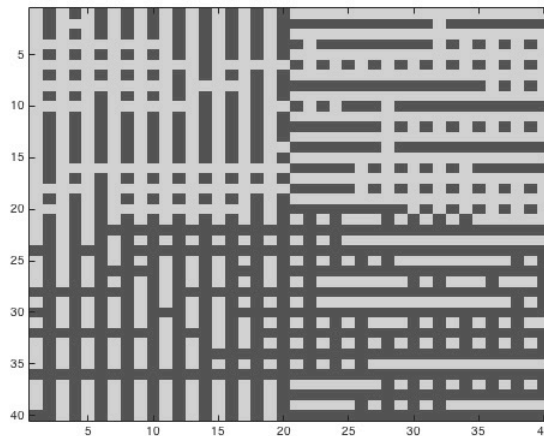


## SBE II: Homework 9

### Experiment-3:

- a) Yes, all of these are stationary states in the network. This means that the output will converge to some value and maintain itself at this value each time it updates.
- b) When you start in any of the three Test states, you still end up in position C in at most 2 iterations.
- c) In the case where we set the initial state to be the binary photo of Nessy, in at most 2 iterations we land in state B.
- d) When adding the Nessy image to our initial weight matrix, and using the same image as the source, Nessy becomes a stable/stationary state of our system.
- e) Starting from Test3, even with Nessy added, you still end up in the same final state (state C) as before.
- f) As can be seen as one example copied below, you can get different final states from this system when starting from a random seed.



- g) The weight rule that we initially set **does** force it to be true that the weights are symmetric. Since we are multiplying a matrix with its transpose in each of the terms included in the weight matrix, each of those results must be a symmetric and square matrix (this is a linear matrix property).
- h) After setting 70% of the elements to zero we still do get the same final/steady state from our network as in the earlier portion, consistently. It is worth noting, however, that the network takes longer to converge (on average, one iteration).