

# COMP9444 Neural Networks and Deep Learning

## Term 3, 2019

### Exercises 7: Hopfield Networks

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1.
    - a. Compute the weight matrix for a Hopfield network with the two memory vectors  $[1, -1, 1, -1, 1, 1]$  and  $[1, 1, 1, -1, -1, -1]$  stored in it.
    - b. Confirm that both these vectors are stable states of this network.
  2. Consider the following weight matrix  $W$ :
$$\begin{array}{ccccc} 0.0 & -0.2 & 0.2 & -0.2 & -0.2 \\ -0.2 & 0.0 & -0.2 & 0.2 & 0.2 \\ 0.2 & -0.2 & 0.0 & -0.2 & -0.2 \\ -0.2 & 0.2 & -0.2 & 0.0 & 0.2 \\ -0.2 & 0.2 & -0.2 & 0.2 & 0.0 \end{array}$$
    - a. Starting in the state  $[1, 1, 1, 1, -1]$ , compute the state flow to the stable state using asynchronous updates.
    - b. Starting in the (same) state  $[1, 1, 1, 1, -1]$ , compute the next state using synchronous updates.
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Make sure you try answering the Exercises yourself, before checking the [Sample Solutions](#)