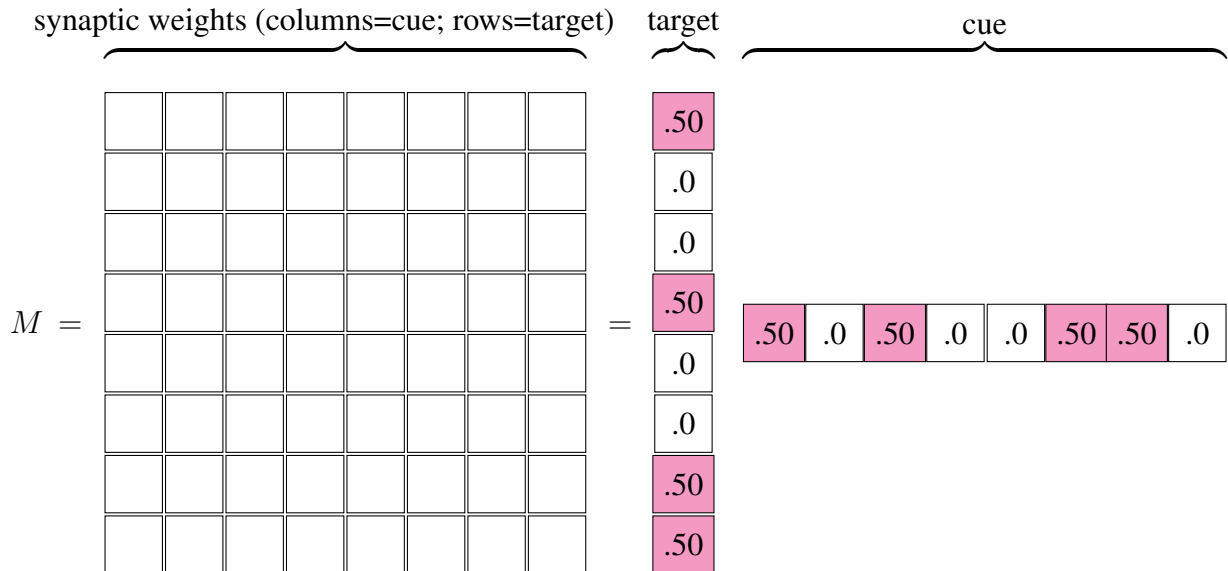


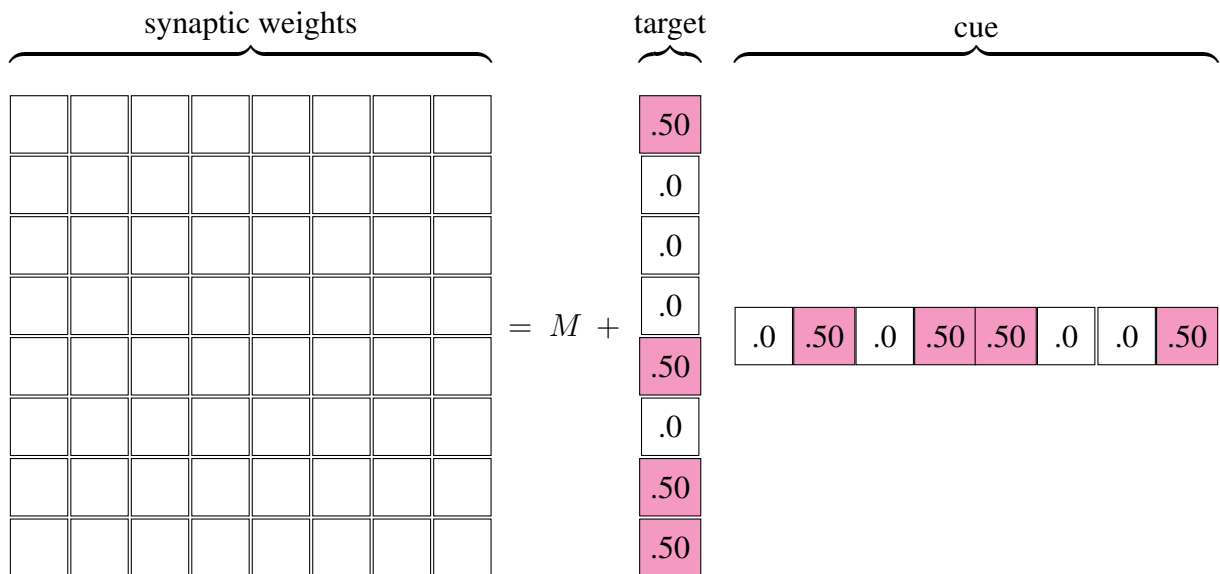
Ling 3701H / Psych 3371H: Problem Set 1

Due via Carmen dropbox at 11:59 PM 1/27.

1. [10 pts.] Suppose you have cue and target mental states characterized by the below patterns of cortical activation. What synaptic weights result from long-term potentiation of the cue state immediately followed by the target state:



2. [10 pts.] Suppose, *in addition to* the synaptic weights M defined in the previous problem, you now have long-term potentiation of the below cue state immediately followed by the below target state. What are the resulting total synaptic weights?



3. [10 pts.] Suppose you have an associative memory consisting of the below synaptic weights, cued by a state with the below activation pattern. What will be the resulting target state?

| target | synaptic weights | | | | | | | | cue |
|--------|------------------|-----|-----|-----|-----|-----|-----|-----|-----|
| | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 |
| | .25 | .0 | .25 | .0 | .25 | .0 | .25 | .0 | .50 |
| | .25 | .25 | .25 | .25 | .25 | .25 | .25 | .25 | .0 |
| | .0 | .25 | .0 | .25 | .0 | .25 | .0 | .25 | .50 |
| | .0 | .25 | .0 | .25 | .0 | .25 | .0 | .25 | .0 |
| | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .50 |
| | .25 | .25 | .25 | .25 | .25 | .25 | .25 | .25 | .0 |
| | .25 | .0 | .25 | .0 | .25 | .0 | .25 | .0 | .50 |

4. [10 pts.] Now suppose you have the same associative memory consisting of the below synaptic weights, cued by the same state, but with parts of its activation pattern missing, as below. What will be the resulting target state?

| target | synaptic weights | | | | | | | | cue |
|--------|------------------|-----|-----|-----|-----|-----|-----|-----|-----|
| | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 |
| | .25 | .0 | .25 | .0 | .25 | .0 | .25 | .0 | .0 |
| | .25 | .25 | .25 | .25 | .25 | .25 | .25 | .25 | .0 |
| | .0 | .25 | .0 | .25 | .0 | .25 | .0 | .25 | .0 |
| | .0 | .25 | .0 | .25 | .0 | .25 | .0 | .25 | .0 |
| | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .50 |
| | .25 | .25 | .25 | .25 | .25 | .25 | .25 | .25 | .0 |
| | .25 | .0 | .25 | .0 | .25 | .0 | .25 | .0 | .50 |