Take Test: Problems 4 - 7

Test Information

Description	The next set of questions pertain to Restricted Boltzmann Machines. Carefully consider the meaning of the expressions that follow.
Instructions	Make sure you review the appropriate material. Three of the questions that follow require you to download an attachment and use the data therein (the data can be embedded into an Excel spreadsheet for convenience
Timed Test	This test has a time limit of 30 minutes.You will be notified when time expires, and you may continue or submit. Warnings appear when **half the time**, **5 minutes**, **1 minute**, and **30 seconds** remain.
Multiple Attempts	This test allows 3 attempts. This is attempt number 1.
Force Completion	Once started, this test must be completed in one sitting. Do not leave the test before clicking **Save and Submit**.
	This test does not allow backtracking. Changes to the answer after submission are prohibited.

Moving to the next question prevents changes to this answer.

Question **1** of **4**

Question 1

5 points Save Answer

Recall that in Restricted Boltzmann Machines, the following relationship, referred to as Contrastive Divergence was proven:

$$\frac{\partial \ln p(\mathbf{v})}{\partial w_{ij}} = \frac{\partial}{\partial w_{ij}} \ln \sum_{g} e^{-E(\mathbf{v},\mathbf{h}^g)} - \frac{\partial}{\partial w_{ij}} \ln \sum_{u,g} e^{-E(\mathbf{v}^u,\mathbf{h}^g)}$$
$$= \langle v_i \cdot h_j \rangle_{\mathbf{v}} - \langle v_i \cdot h_j \rangle_{\mathbf{vh}}$$

where the latter refers to expectation values over vector sets **v** and **vh** respectively and can be used in a learning rule where $\Delta w_{ij} = \varepsilon\left[\langle v_i \cdot h_j \rangle_{\mathbf{v}} - \langle v_i \cdot h_j \rangle_{\mathbf{vh}}\right]$ and ε corresponds to a learning parameter, to update weights so as to maximize the value of ln p(v). Recall that the brackets indicate expectation values of the quantity inside and the subscript corresponds to the domain over which the expectation is calculated. Given the following table of vector values where the first column corresponds to a visible vector, the second column corresponds to hidden vectors produced when that visible vector is presented to the RBM and their corresponding probabilities in the third column, calculate the value of Δw_{11} where ε = 1. You can assume that $\langle v_1 h_1 \rangle = 0.3$. (Hint: this one is quite easy, so don't overcomplicate it!).

Visible Vector	Hidden Vector	Probability of Hidden Vector

Remaining Time: 21 minutes, 54 seconds.

Question Completion Status:

For this problem, you will need to keep in mind what the basic definition of an expectation value is.

⚠ Moving to the next question prevents changes to this answer.

Question **1** of **4**