**Worksheet Open ‘Lec07 student copy’** (use with text, Negnevitsky 3rd ed. pp. 165-200)

* **Slide 14 Perceptron:** Form a group of five with one of you as the linear combiner and the others as four inputs, create a perceptron to advise on whether to see particular films.

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* **Slide 17 Linear separability:** How many dimensions would your decision surface have for your four-input perceptron? Create a one-input perceptron with its decision surface.

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* **Slide 24 AND, OR, XOR:** Modify your ‘film advisor’ perceptron such that it can select films that are neither too tame nor too violent.

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* **Exam question 07-1:** How does the perceptron learn its classification tasks?

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* **MATLAB:** Perceptron\_AND Perceptron\_OR Perceptron\_XOR

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* **Exam question 07-2:** MATLAB Explain why the above output is the way it is.

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* **Slide 30 Back-propagation neural network (MLP):** What is being back-propagated? What is the sigmoid function?

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* **Slide 43 Learning curve for operation Exclusive-OR:** Scatter 10 dots on a page. Draw a straight line anywhere across the whole page and going between some of the dots. Put on X and Y axes. Calculate the mean sum squared (MSS) for that line. Repeat for another line.
* **Slide 45 Network represented by McCulloch-Pitts model for X-OR:** Prove to yourself the numbers work.

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* **Exam question 07-3:** Show how decision boundaries in the McCulloch-Pitts model for the XOR are . derived

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* **MATLAB:** *Bipolar\_XOR\_bp (-1 1 etc)* XOR\_bp (0 1 etc)

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* ***Exam question 07-4:*** *MATLAB Explain the differences between the above algorithms.*
* **Slide 47 Accelerated learning in multilayer neural networks:** What is a hyperbolic tangent?

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* **MATLAB:** XOR\_bp\_alr XOR\_bp\_m XOR\_bp\_m\_alr

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* **Exam question 07-5:** MATLAB In the examples shown how is learning being accelerated?

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* ***MATLAB:*** *Hopfield*

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* ***Exam question 07-6:*** *What is the relationship between the auto-associative Hopfield network and the hetero-associative BAM network?*
* **Demo task 26** Complete the Matlab introduction (Mathworks site)
* **Wiki 26** Compare Matlab, Mathematica, Sage and C++ as development platforms.
* **Demo task 27** Perceptron\_XOR & Perceptron\_XOR\_your\_initials p.170
* **Wiki 27** Modify such that the perceptron can solve the XOR.
* **Demo task 28** XOR\_bp p.175
* **Wiki 28** Compare performances of XOR\_bp\_alr XOR\_bp\_m XOR\_bp\_m\_alr p185