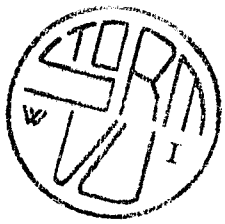

Exam Neural Networks (Theory Part)
August 12, 2003

Please do not use any notes, books, slides, etc.

1. **Perceptron/Adaline**
   - (15 points) Describe in detail the Adaline architecture, neuron model and learning algorithm.
   - (10 points) Compare Perceptron and Adaline.
2. **Feed-Forward Neural Networks**
   - (10 points) Describe the type of activation function used in the Backprop algorithm.
   - (5 points) Which functions can be represented by a FFNN with a single hidden layer?
3. **Radial Basis Function Networks**
   - (10 points) Describe the architecture and hidden neuron model of a RBF network.
   - (10 points) What are the RBF network parameters which have to be learned?
4. **Self Organizing Maps/Competitive learning**
   - (5 points) What is unsupervised learning?
   - (15 points) Describe in detail the SOM algorithm: initialization, sampling, similarity matching, updating and continuation.
5. **Hopfield Networks/Brain-State-in-a-Box Networks**
   - (20 points) Describe in detail the Hopfield discrete NN: type of input, number of neurons, architecture, neuron state, network state, activation function, weights properties, weights computation, NN execution (retrieval).