Neurocomputing: Fundamentals of Computational Neuroscience

Assignment 4 due October 22 in class (20 points)

<u>This assignment is to be solved and submitted individually!</u>

1. What is the amount of information when transmitting a character in ASCII code? (4)

2. What is the maximal average amount of information (entropy) that can be transmitted with a Poisson spike train with an average firing rate of 100 Hz? (4)

3. What is the maximal firing rate of an integrate-and-fire neuron with an absolute refractory time of 2ms? (2)

4. How many hidden layers are necessary to implement the Boolean XOR function with a feedforward neural network? Can the activation function of the hidden nodes be linear? (Explain briefly) (4)

5. A Boolean function can be defined with a truth table. A specific Boolean function is given by the following truth table

x_1	x_2	y_1	y_2
true	true	true	true
true	false	false	true
false	true	true	false
false	false	true	true

   a) a) Is this function linear separable? (3)
   b) b) Draw a network architecture and specify the weights and threshold values that implement this function (3)