PSYCH/CS L 271 – PRACTICE EXAM

For each of the Questions 1 to 7, exactly one of the four given answers (a) to (d) is correct. Please circle the letter of that answer. You will get one point for every correct answer.

Question 1: With what kind of information are backpropagation networks trained?

(a) Mathematical functions
(b) Examples of inputs and desired outputs
(c) Instructions in a programming language
(d) Instructions in a natural language

Question 2: After training a self-organizing map, …

(a) … neighboring units in the output layer usually respond to similar inputs
(b) … neighboring units in the output layer usually respond to very different inputs
(c) … all neurons respond strongest to the same input
(d) … most neurons do not respond to any input

Question 3: Which of the following problems is best suited for an artificial neural network solution?

(a) Storing the names and ID numbers of students and retrieving names for particular IDs
(b) Computing the sum of a list of numbers
(c) Playing chess
(d) Recognizing faces in images

Question 4: Why do finite automata have less computational power than Turing machines?

(a) Because the have less memory
(b) Because they have fewer states
(c) Because they work more slowly
(d) Because they can process longer input strings

Question 5: What is special about the function HALT(x, y)?

(a) It cannot be computed by any algorithm
(b) It cannot be mathematically defined
(c) It can only be computed by neural networks
(d) It is the function underlying modern microprocessors

Question 6: What is the main purpose of expert systems?

(a) To automate critical decision making in complex procedures
(b) To support human decision making by providing expert knowledge
(c) To evaluate human experts
(d) To simulate neural processes in the human brain

Question 7: Why are backpropagation networks biologically implausible?

(a) Because they require an external teacher who adjusts the synaptic weights
(b) Because they consist of layers
(c) Because neurons in BPNs receive input from multiple other neurons
(d) Because each neuron only generates one output signal

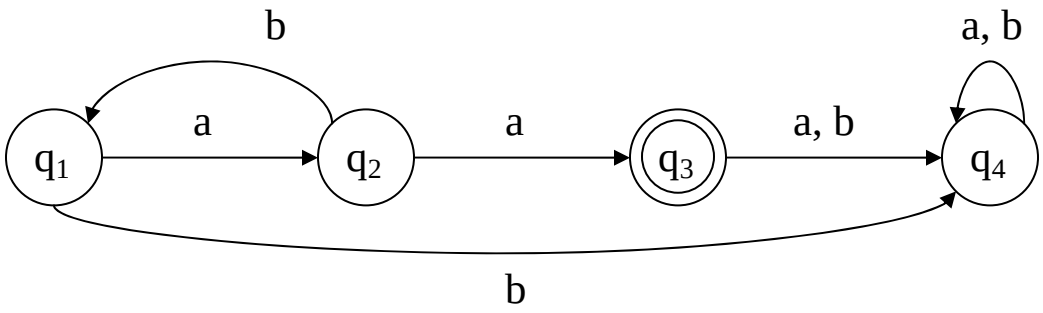
For each of the Questions 8 to 10, write down your answer in a few sentences. You will get a maximum of two points for every answer.

Question 8: What are the main differences between human brains and today's computers?

Question 9: Explain the distinction between cognitive scientists and engineers in Artificial Intelligence.

Question 10: What are the main components of algorithms for board-game playing? In these algorithms, what information is represented by trees?

Question 11 (2 points): Which language L on the alphabet A = {a, b} does the following finite automaton accept?



(a) L = {ab, abab, ababab, …}
(b) L = {aa, aba, abba, abbba, …}
(c) L = {aa, abaa, ababaa, abababaa, …}
(d) L = {aa, aab, aaab, aaaab, …}

Question 12 (3 points): Draw a finite automaton that accepts the language
L = {abb, aabb, aaabb, aaaabb, …}