



MACHAKOS UNIVERSITY

University Examinations for 2018/2019

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

FOURTH YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE (COMPUTER SCIENCE)

SCO 411: NEURAL NETWORK

DATE: 22/7/2019

TIME: 11.00-1.00 PM

INSTRUCTIONS

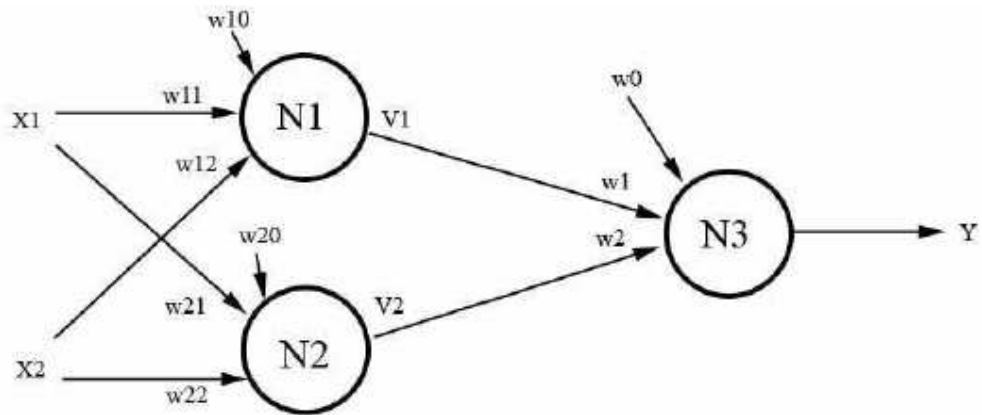
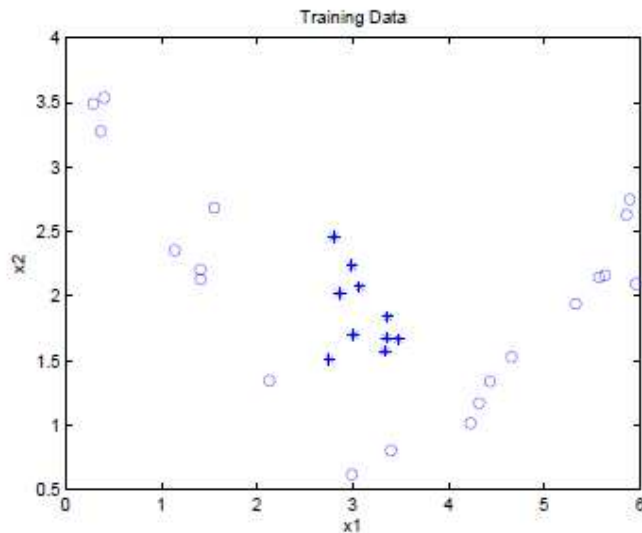
Answer question **ONE** and **Any** other **Two** among the four selective questions

QUESTION ONE (COMPULSORY)

- a) State any three reasons for studying ANN (3 marks)
- b) Discuss the components of Artificial Neural Network (12 marks)
- c) Describe Hopfield learning algorithm (15 marks)

QUESTION TWO

- a) Consider the following classification training data (where “*” = true or 1 and “O” = false or 0) and neural network model that uses the sigmoid response function $g(t) = \frac{1}{1+e^{-t}}$.



We would like to set the weights (w) of the neural network so that it is capable of correctly classifying this dataset. Please plot the decision boundaries for N1 and N2 (e.g., for neuron N1, the line where $w_{10} + w_{11} * X_1 + w_{12} * X_2 = 0$) on the first two graphs. In the third graph, which has axes V_2 and V_1 , plot $\{V_1(x_1, x_2), V_2(x_1, x_2)\}$ for a few of the training points and provide a decision boundary so that the neural net will correctly classify the training data. (8 marks)

- b) Describe the four differences between the human brain and today's computers (8 marks)

QUESTION THREE

- a) A student would like to decide whether to attend a wedding party. The decision variables are weather condition, availability of transport, and completion of assignment. Explain how the decision would be made using artificial Neural Network. (11 marks)
- b) Discuss any three areas of application of artificial Neural networks (9 marks)

QUESTION FOUR

- a) Explain the three phases of training ANN by back propagation (9 marks)
- b) Explain the equation $Distance(LMS) = \frac{1}{2} \sum_p (T_p - O_p)^2$ (3 marks)
- a) Given the following points $(x_1 = -1, x_2 = 1)$ with target 1, $(x_1 = 1, x_2 = 1)$ with target 1, and $(x_1 = 0, x_2 = 2)$ with target 0. If the classifier has a bias term with a value is fixed at 1, write down the inequalities, represent them in weight space and indicate the feasible region. (8 marks)

QUESTION FIVE

- a) Discuss three types of learning rules (9 marks)
- b) Using well labelled diagrams, explain the types of artificial neural networks (architectures) (9 marks)
- c) Define ANN (2 marks)