

ML Quiz: What are Neurons by CCL

1. What are neurons in an Artificial Neural Network (ANN)? (time stamp: 1:50)
 - ☐ The input image.
 - ☐ Weights and biases.
 - ☐ Activation functions, e.g. the sigmoid function.
 - ☐ A unit which takes a group of weighted inputs, applies an activation function, and returns an output.
2. Given $\mathbf{a} = \sigma(\mathbf{x}) = \frac{1}{1+e^{-\mathbf{w} \bullet \mathbf{x} + \mathbf{b}}}$, if \mathbf{x} and \mathbf{a} are column vectors of size 10 (shape: **1, 10**), what are the corresponding shapes of \mathbf{w} and \mathbf{b} ? (time stamp: 1:52)
 - ☐ **(10,10)** — **(10,1)**
 - ☐ **(10,10)** — **(1,10)**
 - ☐ **(1, 10)** — **(10, 1)**
 - ☐ **(1, 10)** — **(10, 10)**
3. What is range of possible outputs of the sigmoid function? What meaning does it have? (time stamp: 3:20)
 - ☐ 0 or 1 — Binary class predictions.
 - ☐ [0,1] — Probabilities.
 - ☐ (0,1) — Probabilities.
 - ☐ [0, 100] — Percentages.
4. Which of the following is NOT true about neurons in ANNs? (time stamp 3:56)
 - ☐ Each hidden layer has its own neurons.
 - ☐ Neurons must contain the sigmoid function.
 - ☐ Weights and biases inputted to a neuron are trainable and updated during training.
 - ☐ When a linear activation function is defined, the summation of the dot product of \mathbf{x} and weight neuron(s), added to the bias neuron is used to update \mathbf{x} .
5. What is the purpose of selecting different non-linear activation functions (E.g. Sigmoid, ReLU, Tanh) for neurons? (time stamp: 3:22)
 - ☐ To make training faster for each iteration.
 - ☐ To map the input to different ranges based on need.
 - ☐ To reduce overfitting problems.
 - ☐ To reduce model complexity.

Answers: D, B, C, B, B