$$a = f(x) = \frac{1}{1 + e^{-(wx+b)}}$$

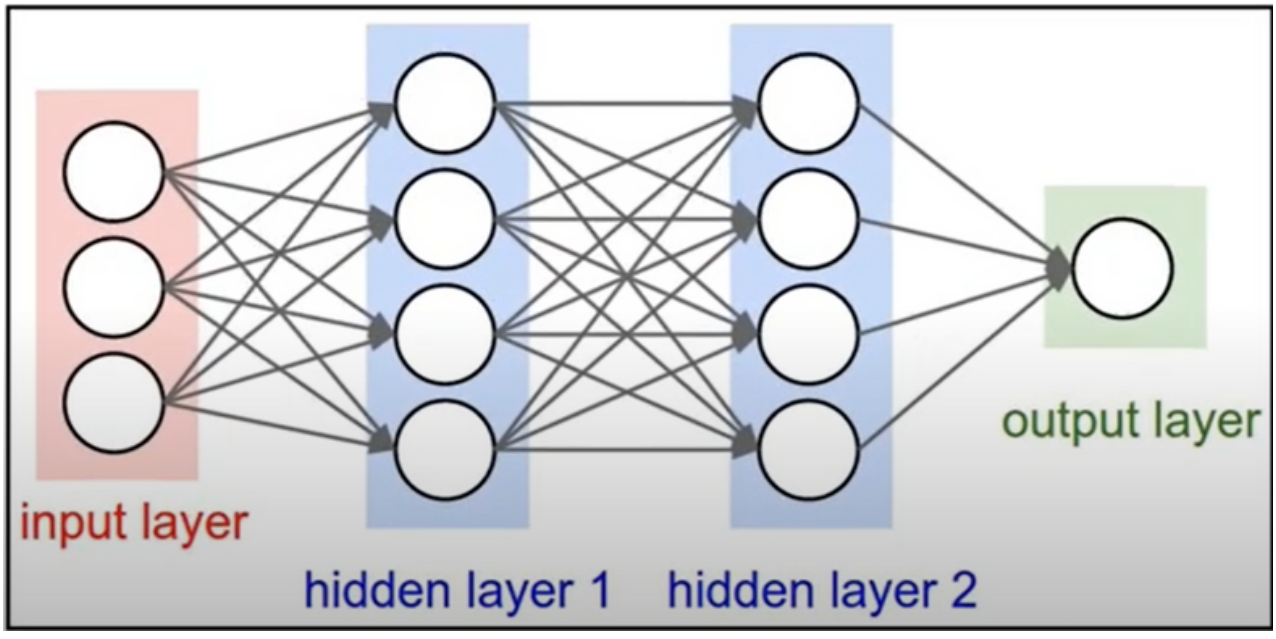
activation — output

The term a stands for activation, and it's actually a term from neuroscience, and it refers to how much a neuron is sending a high output to other neurons downstream from it.

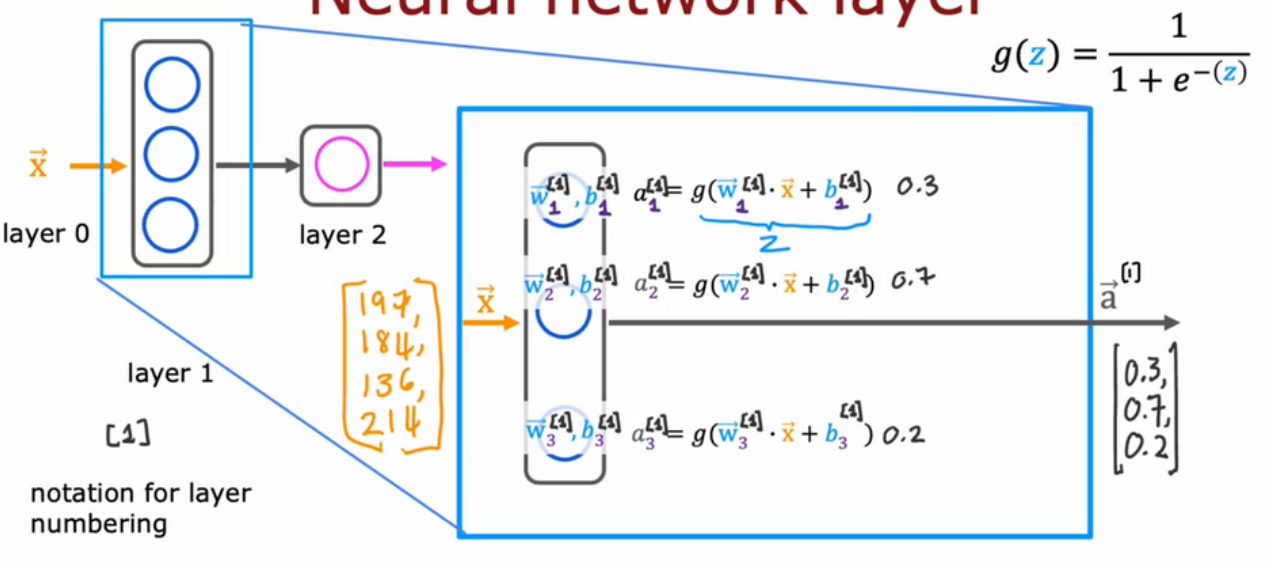
Neural Network Terminologies

1. **x:** Typically represents the input data or feature vector. In the context of a neural network, it's the data that you're passing into the network for processing.
2. **θ (theta):** Often used to represent the parameters (weights and biases) of the neural network. These parameters are learned during the training process to make accurate predictions.
3. **w:** Represents the weights associated with connections between neurons in a neural network. These weights are adjusted during training to influence the network's behavior.

4. **z:** Represents the weighted sum of inputs to a neuron, before applying an activation function. It's calculated as the dot product of the input data (x) and the weights (w), plus a bias term.
5. **g:** Stands for the activation function that introduces non-linearity to the neuron's output. Common examples are ReLU, sigmoid, and tanh.
6. **Layer (L):** Refers to a collection of neurons that process input data together. The layers are stacked to form the neural network's architecture.
7. **ŷ (y hat):** Represents the predicted output of the neural network. After passing the input data through the network, ŷ is the value produced by the output layer.
8. **y:** Stands for the actual target output or ground truth corresponding to the input data. During training, the neural network aims to minimize the difference between ŷ and y.
9. **δ (delta):** Often used in the context of backpropagation, δ represents the error signal associated with a neuron. It's calculated by taking the derivative of the loss function with respect to the neuron's output.
10. **σ (sigma):** Typically used to represent the sigmoid function, which is an activation function that maps the weighted sum of inputs to a value between 0 and 1.
11. **Σ (sigma):** Represents summation. In neural networks, it's used to indicate the sum of weighted inputs.
12. **D:** Refers to the dimensionality or the number of features in the input data (x). It corresponds to the number of input neurons in the network's input layer.
13. **cost:** Also known as the loss or error, the cost quantifies the discrepancy between the predicted output (ŷ) and the actual target output (y). The goal during training is to minimize this cost.



Neural network layer



More complex neural network