

## Problem 1

One-Layer Neural Network:

Average Training Loss: 0.5465592651314404

Average Testing Loss: 0.6603950881246898

Two-Layer Neural Network:

Average Training Loss: 0.47572964964012837

Average Testing Loss: 0.5941915196788878

As seen above, the one-layer network has higher average losses, compared to the two-layer network. Therefore, increasing the number of layers decreased the average loss.

## Problem 2

The parameters I chose for one-layer were: learning rate of 0.001, and 25 epochs. If I increased the learning rate to 0.1, this caused the average training loss to increase to 0.6362560291173314, and the testing loss to increase to 0.73713829880551. If I decreased the learning rate to 0.0001, this drastically increased the average training loss to 1.797935567458054, and the testing loss to 1.7815279573717808. If I increased the epochs to 45, the average testing loss was only slightly decreased. If I decreased the epochs to 15, there was no notable change to the losses.

The parameters I chose for two-layer were: hidden size of 10, learning rate of 0.01, and 25 epochs. If I decreased the hidden size to 5, the average training loss slightly increased. If I increased the hidden size to 20, both training loss and testing loss increased. Similarly, if I decreased the learning rate to 0.001, both losses increased. If I increased the learning rate to 0.15, both losses (again) increased. Lastly, if I decreased the epochs to 15, both losses only slightly increased, and if I increased them to 35, losses still increased.

## Problem 3

**a.** I believe that both should be equally believed in this scenario, as there is room for error in both a human expert's judgement call, as well as the black box algorithm itself. Moreover, since it is a 'black-box' algorithm, it is non-transparent and very likely to also produce a possibly biased result. Therefore, I believe that the human expert should first be believed, and the algorithm investigated (i.e., 'opened up'), as it very well could be producing a false, or even biased, result.

**b.** I do believe there is a difference between both companies. At the very least, companies

with closed source software are aware of how their programs actually work. Thus, if any of their products do produce inaccurate or biased results, the company is still liable to be investigated and be responsible for the error of the program. However, with companies selling 'black-box' algorithm-using software, they are just as clueless as the consumer in regards to how the algorithm actually works, and thus at the mercy of the AI company producing the software. Any company selling a product that could potentially have an adverse impact on their consumers should at the very least be aware of how it works. Therefore, I think it is more justifiable to be selling a closed-source software, because at least there exists entities within the company that are aware of how it functions.