Answer the five following questions, two marks for each:

•Which of these algorithms provides the best performance?

Backpropagation provides the best performance because of how exact it is; however, I used ADAM optimization for feedback which resulted in better results than backpropagation. ADAM optimization was needed for feedback but not for backpropagation.

•Which provides the worst?

Weight perturbation provides the worst performance because it is the equivalent of guessing.

•How does their performance scale with the size of the network?

The more layers there are, the more effect the network is.

•How does their performance change with different batch sizes?

Larger batch sizes don’t generalize as well, and each iteration takes longer. Smaller batch sizes work better for regularization, but more batches need to be run to achieve the same accuracy as large batches.

•Given your answers to the questions above, and biological constraints that you can think of, which of these algorithms are most likely to exist in the brain, in your opinion? Provide your reasoning. There is no “right” answer here. You will be marked on how cogent your reasoning is.

Feedback alignment is the most likely because of how it is random in nature, but is effective like backpropagation.