CPSC 383 – Winter 2025
Tutorial worksheet: Autoencoders

Your TA will start with a short introduction explaining a bit about autoencoders and giving some helpful tips for implementation. After this, you will be creating your own autoencoder for the MNIST dataset. Feel free to use your code from previous tutorials or your second assignment as a starting point. Once your autoencoder is working, use it to answer the listed questions, discussing your answers in groups of 3-4 students. To receive credit for this worksheet, you will need to demo your autoencoder to your TA during the tutorial and share your answers to the provided questions.

To complete the worksheet, test your autoencoder with 100, 10, and 2 neurons in the hidden layer, looking carefully at the results each time. For **each** of the three versions of your autoencoder, answer the following questions.

1. What is the **dimensionality** of the encoding produced by your autoencoder?

2. What is the final testing accuracy of your autoencoder? What is the final testing loss?

3. Did you have to change any of your learning parameters (number of epochs, learning rate, etc.) to properly train this version of your autoencoder? And if so, why do you think that is?

4. Look at how your autoencoder performs on the ten testing images provided in the starter code. What types of information do you think the encoder might be keeping about the original image? What might it be discarding? Do you notice anything interesting? How does it compare to the other versions of your autoencoder?

5. Now, consider how your autoencoder performs on the five samples of 28×28 random noise provided in the starter code. Do you notice anything interesting here? Are the five inputs similar to each other, given how you are representing the data? What about the outputs? Why do you think this is? Does this change depending on how many neurons are in the hidden layer?