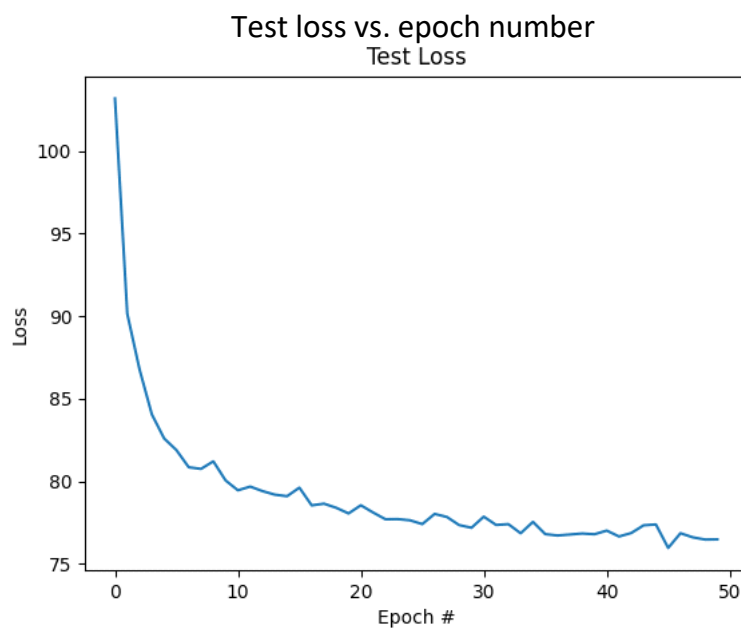
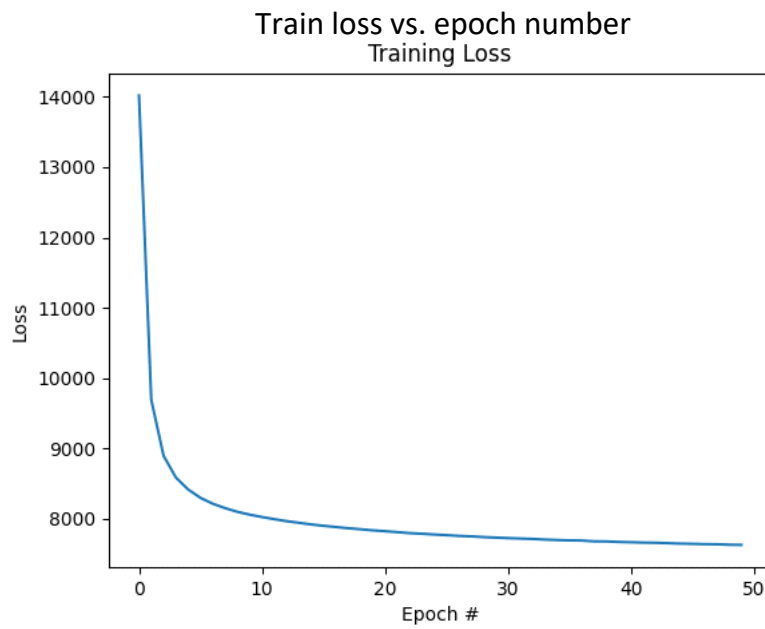


A4 Q2

July 14, 2022 7:55 PM

EX2:

A)



Epoch 10

Epoch 20

Epoch 30



Epoch 40

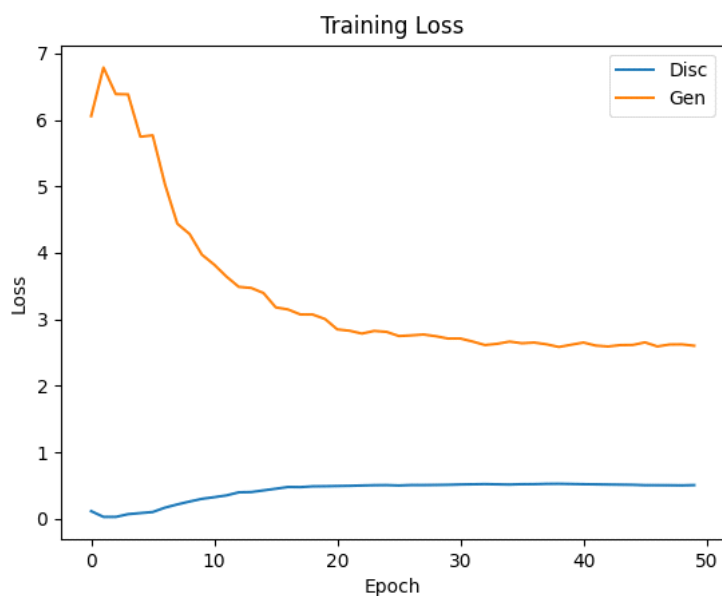


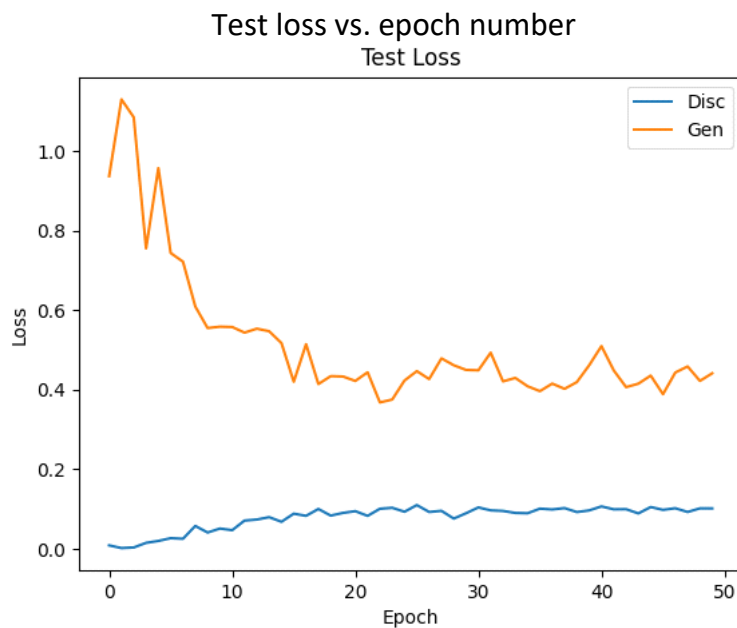
Epoch 50



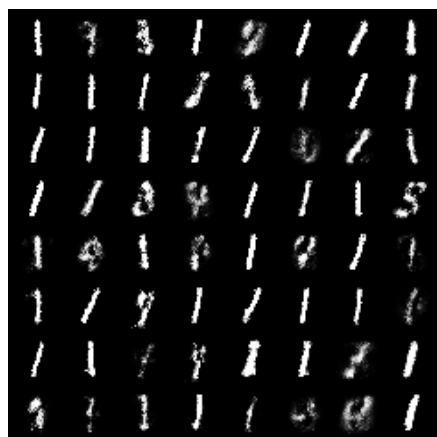
B)

Train loss vs. epoch number





Epoch 10



Epoch 20



Epoch 30



Epoch 40



Epoch 50



C)

The result from VAE is very blurry, and the improvement with epochs is not very significant. Even after epoch 50, there are still some graphs with weird shapes and strokes. Many strokes are darker than the real hand-drawn one, which probably means the model is not very "confident" about those numbers. However, we can see that the generation is kind of "uniform". It looks like almost all 10 digits are generated with equally probability (or at least similar) because they almost have the same amount.

The result from GAN is much clear. We can also see the improvement quality as the epoch

number increases. The stroke is also very solid. However, the number generated are most the "easy" patterns like ones or eights.

In general, the results from GAN is much better than those from VAE because GAN's results looks more solid and real from human's eyes (mostly, my eyes). However, it might be hard to control what we want GAN to generate, or what feature we want GAN to generate. In VAE, because the distribution of 10 digits in the dataset is uniform, the generated digits are also some what uniform because essentially VAE is mapping the distributions by encoding and decoding. However, for GAN, it only needs to "cheat" the discriminator, and I assume that some how digit one is easy to generate and to cheat the discriminator with since it is just a single stroke. That is to say, GAN may tend to choose some "easy" ones to generate.