1. Problem 1
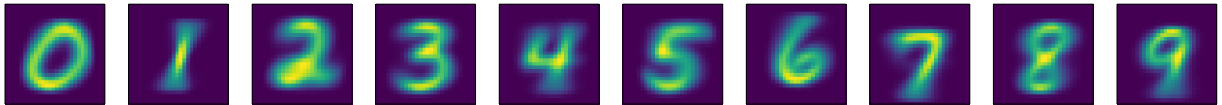
40 points

Please run all the cells in this Colab ("A3 naive bayes on MNIST.ipynb") here.

After running all the cell, you should have generated this file **nbc_mnist_centroids.pdf**, which appears as in the below figure:

Questions:

1.a. What are the above digits and why are they very blurry (compared to the real handwritten digits in MNIST)?

The above digits are a representation of the smoothed training data. It is more blurt to the handwritten images because these are a compilation of the training images where the lighter yellow color represents the most common pixels and the darker blue represents the less common pixels. The variance between training images is what causes the blur.

1.b. The current code uses MAP to estimate the parameters for $P(x/y)$ and scores at 84.27% accuracy. Implement MLE estimation and report the accuracy of this classifier. The accuracy decreases to 84.26% accuracy from 84.27%,

Write your answers to the above 2 questions into a single PDF file and name it as **problem1ab.pdf**