INF2B CW2 Report 1

S1703935

Task 1 - PCA and Clustering

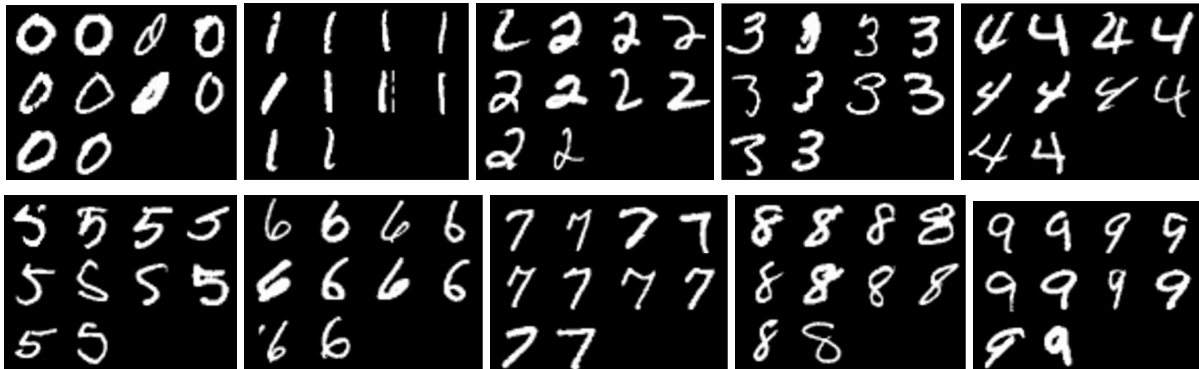### Task 1.1

Figure k (k=1,...,10) shows the images of the first ten samples in
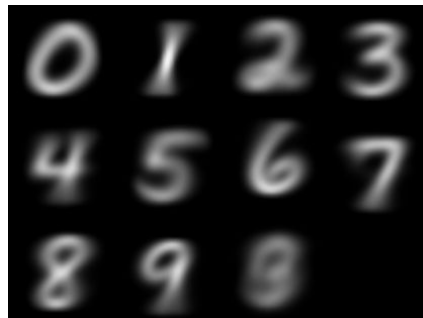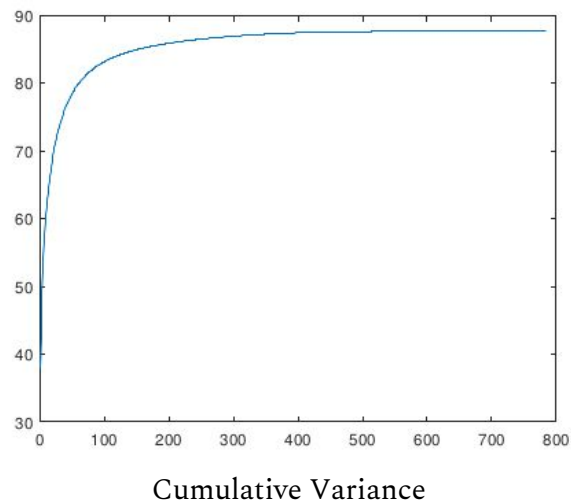the training data (Xtrn) for Class k

Task 1.2

Figure 1.2

Task 1.3

Cumulative Variance

INF2B CW2 Report 1

S1703935

Percentage	70%	80%	90%	95%
MinDim	11	23	53	103

Minimum numbers of PCA dimensions to cover
70%, 80%, 90%, and 95% of the total variance

Task 1.4
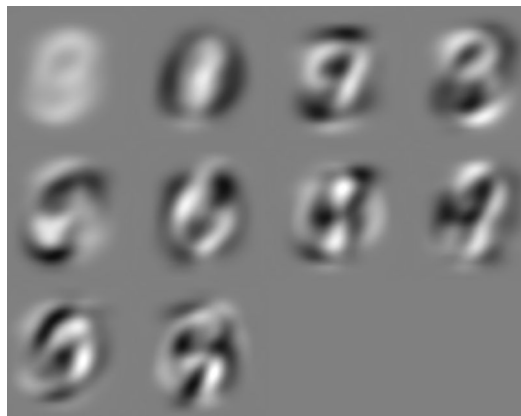
Figure 1.4

Task 1.5
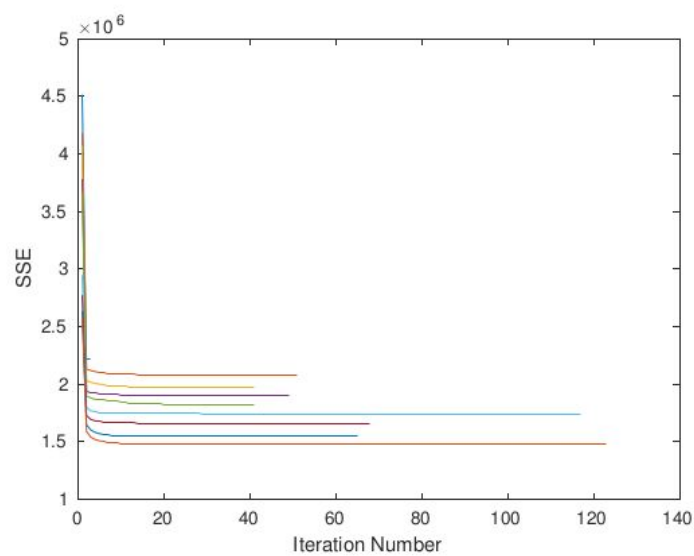
SSE for Each k

INF2B CW2 Report 1

S1703935

Ks	1	2	3	4	5	7	10	15	20
Time Taken (s)	0.8042	18.5346	15.3626	16.8677	15.1478	48.0557	29.5334	28.5177	57.1549

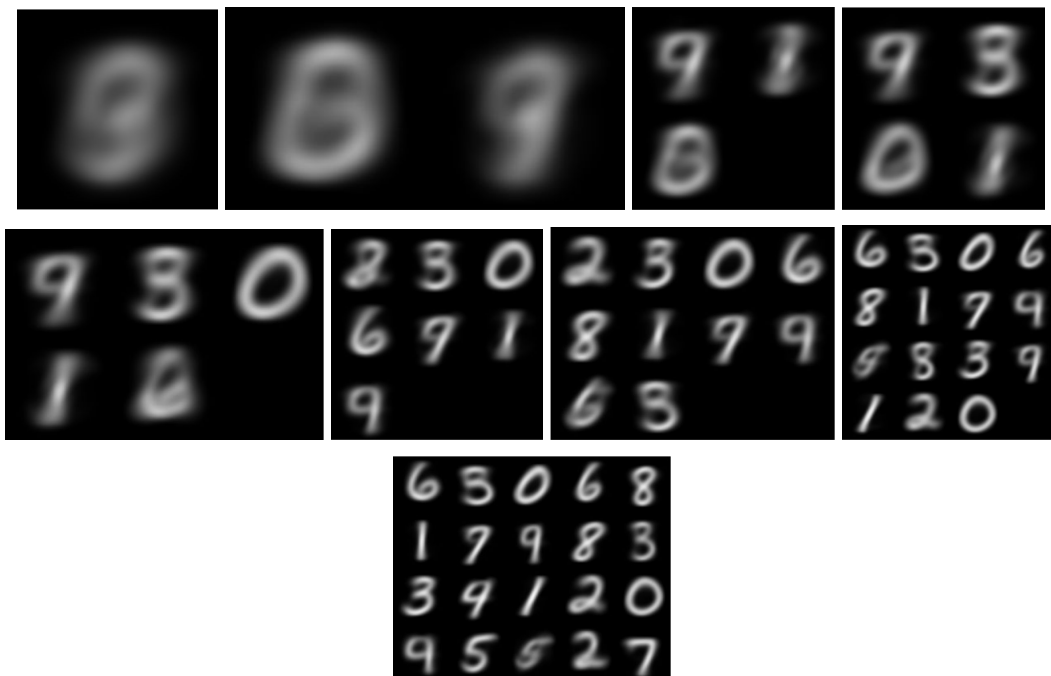Table displaying the times for each k when running KMC

Task 1.6

Figure i displays the images of cluster centres
obtained with k-Mean clustering when k = Ks(i), i=1,...,9

Task 1.7

For this task, I used a combination of the methods found in the labs as well as the notes. For the reshaping of the point I used the following before rearranging to increase the efficiency:

$$\mathbf{y}^{(Y)} = V^T(\mathbf{x} - \mathbf{p})$$

When setting the linscape, I used the following given in the question:

$$m \pm 5\sigma$$
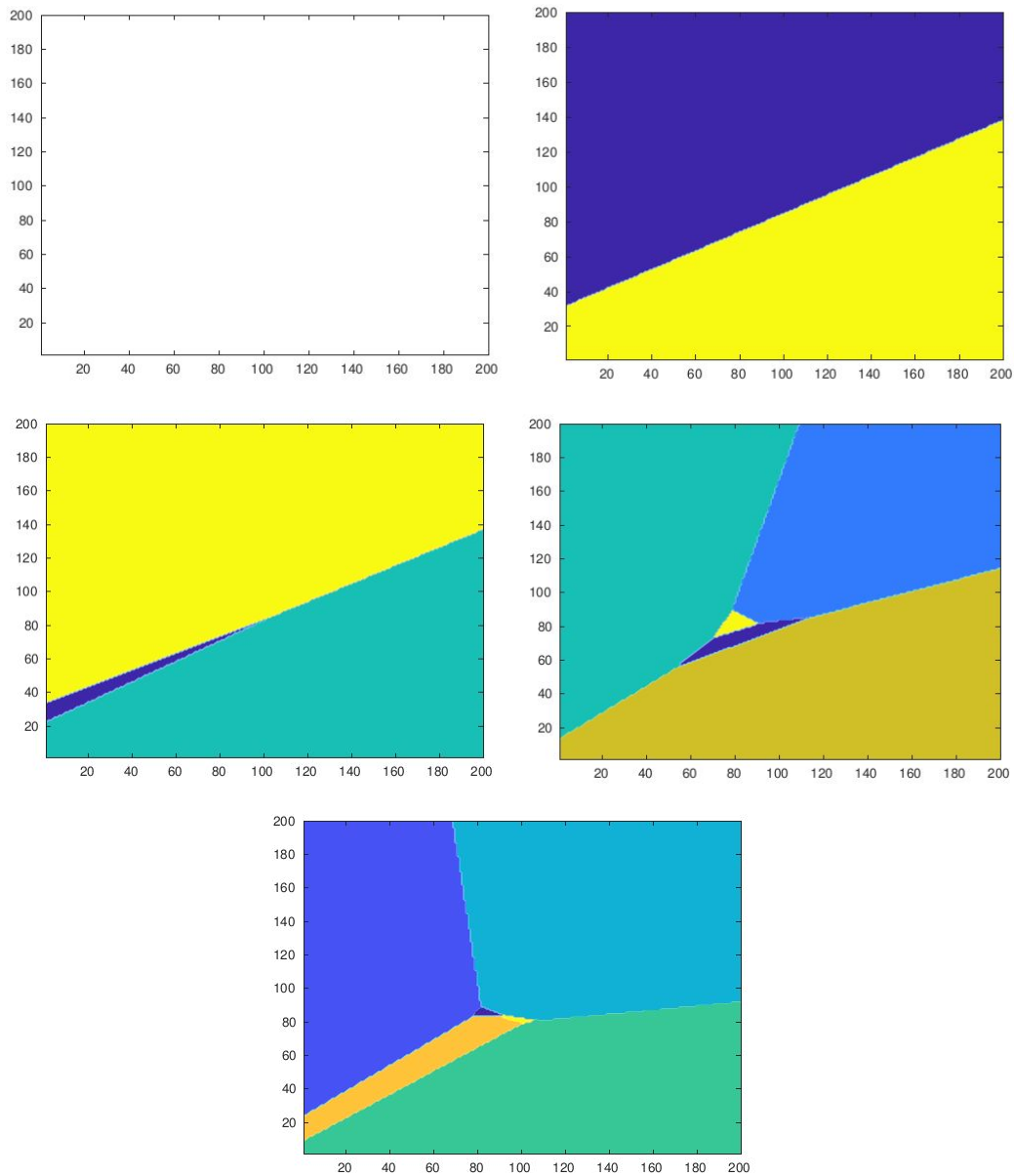
INF2B CW2 Report 1

S1703935

Figure i (i=1,...,5) displays a cross section of the
cluster regions for k, where k is the i-th element in [1,2,3,5,10]

Task 1.8

Unfortunately, I did not get the chance to complete this task.