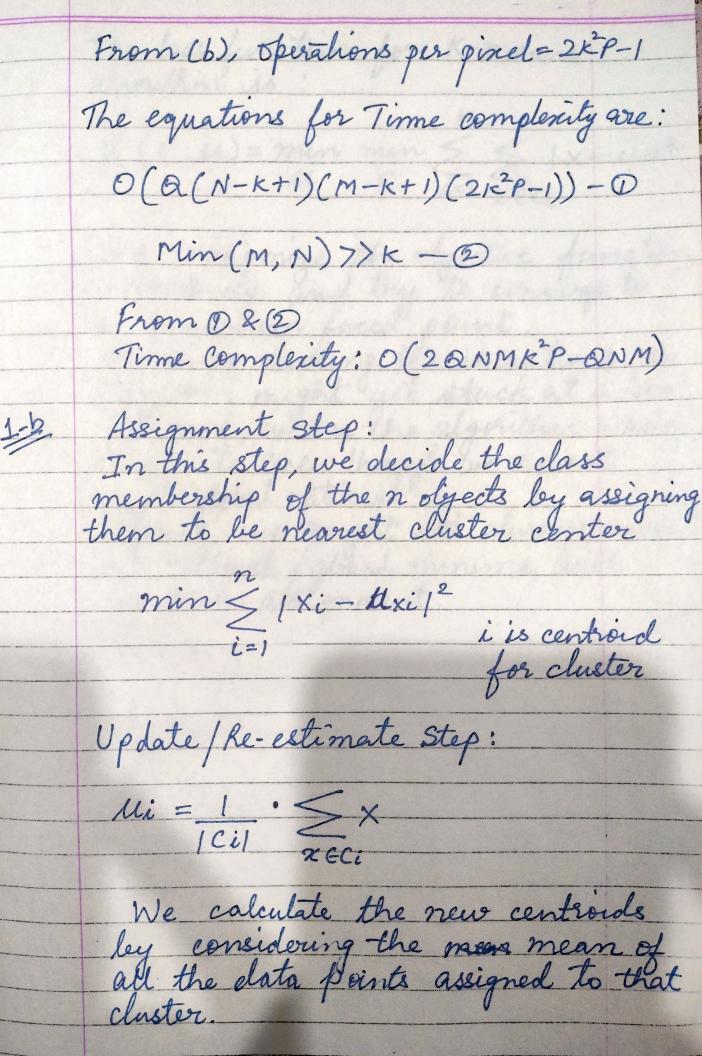
ML Assignment #4 Aditya Aggarwal (2022028) 1. (a) (a) The width of the image is N-K+1
The height of the image is M-K+1 Then, after convolution, the dimensions are: $(N-k+1)\times(M-k+1)$ (b) To compute a single output pinel in the resulting feature map during the forward pass of a convolutional layer, we consider the input image of dimensions MxN with P channels and a single Kernel of size KXK. For each channel, the kernel involves KXK multiplications. Since, there are P channels, the total number of multiplications across all channels is K^2P . After the multiplications the resulting K^2P elements are summed to compute the final value of the output pixel. Summing KP elements requires K2P-1 additions. the total number of elementary operations for a single output pinel is $K^2P + (K^2P - 1) = 2K^2P - 1$ (C) The image output size = (N-K+1)(M-K+1) X & where Q is number of Kernels



The loss function for K-means algorithm is: $\mathcal{L}(C, u) = \min_{u \in C} \min_{i=1}^{\infty} \sum_{\chi \in C_i} |\chi - u_i|^2$ We minimize the objective function iteratively and try to converge to a minimum fixed point. However, during the iterations, the algorithm might get stuck at a local optimal, where the algorithm would terminate even though we did not reach global optimal. Hence, we might not always arrive at optimal / global minima with random assignment.