

Q-3.2] (i). Image 1 Cubes

$k=2$ → Since we have two clusters, we can just make out the position of cubes, but their orientation / lighting is unclear.

$k=5$ → Since the cubes image has a very small number of pixels,

Q-3.2] As the number of clusters increase, the
ii) image becomes more and more similar to the original image. At $k=2$, we just have 2 clusters and this gives a very 'coarse' segmentation i.e. cube or no cube (image-1)

foreground vs background (image 2, 3)
As k increases to 5, more aspects in the image become clear, like orientation of cubes in image 1, race track in image 3.

At $k=10$, the 1st image is nearly restored while the others give a somewhat 'noisy' segmentation of the image components.

iii). Some Images (like image-1) have nearly discrete colours, (and fewer colours), and hence, having less clusters can ~~keep~~ preserve the information in the images.

But some images (like image-2) have continuous and a huge spectrum of colours. Hence it becomes difficult to preserve information in these images with less clusters and we need more clusters for preserving image-data.