1. **Row Manipulation:** Row Manipulation: Given a 1D array (a_1,a_2,a_3……a_{2n},a_{2n+1}), rearrange to: (a_1,a_3,a_5……a_{2n+1},a_2,a_4,a_6……a_{2n}) given the matrix P.
   Using the permutation matrix we can use matrix multiplication as explained below:
   If we have an identity matrix of 4x4 and have 4 elements then:

$$\begin{bmatrix} a_1 \\ a_2 \\ a_3 \\ a_4 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} a_1 \\ a_2 \\ a_3 \\ a_4 \end{bmatrix}$$

   Now, if we replace Identity matrix with P matrix then:

$$\begin{bmatrix} a_1 \\ a_3 \\ a_2 \\ a_4 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} a_1 \\ a_2 \\ a_3 \\ a_4 \end{bmatrix}$$

   That is our required task and it can be done using the above matrix multiplication operation.

2. **K-means:** 1. For termination of algorithm we can implement two things:
   i. Can use a cap on number of iterations algorithms should perform
   ii. We can check on the norm of difference between previous and new cluster mean, if there is not enough change then we can terminate the algorithm. For accomplishing this we can define a threshold epsilon that can vary according to data or we can go to extremes and set epsilon to zero.

   These methods are used in my implementation of algorithms.

   2. Yes it can! It will totally depend upon the data and the initialization of cluster means. As k means clustering algorithm is not a convex function rather has convex regions, hence the converged solution can stuck to a local minima and different implementations may provide different solutions depending upon the initialization.