Programming 1: Lab 9 : Lists and Sets

Write the python code for the following questions. Handle all the valid and invalid test cases. Write down relevant comments in your code:

1. Take a list of positive integers as input in a list and perform the following operations:
   1. Remove duplicate elements. Do not use sets or any other in-built functions except len().
   2. Remove duplicate elements by typecasting into sets and displaying resulting elements in the same order as they appear in the input list.
2. Take two lists of values as integers and perform the following operations:
   1. Convert the lists into sets (set A and set B). This will retain only the unique elements.
   2. Find the union, intersection, set difference (A-B), symmetric set difference ((A-B) U (B-A)) of the two sets.
   3. Find the result of the intersection operation by using the initial two input lists. Do not use sets and inbuilt set functions.
   4. Find the result of the union operation by using the initial two input lists. Do not use sets and inbuilt set functions.
3. Represent 2D square matrix of dimensions N x N, by taking N and matrix elements as input from the user. Perform following operations on these 2D matrices.
   1. Check if the matrix is a symmetric matrix or not.
   2. Find the sum of the two diagonal elements. Principle diagonal and non-principle diagonal.
   3. Check if the matrix is an upper triangular matrix or a lower triangular matrix.
   4. Find the transpose of the matrix.
4. Design the algorithm for converting a 2D square matrix into the row echelon form. The row echelon form is when the matrix is converted to upper triangular form by using only the row operations, where the row operations are defined as simple linear combinations of rows.