Some additional questions

1. Show that the identity matrix I_n (the identity matrix of size $n \times n$) is invariant under change of basis transformation.
2. Definition: A square matrix A is called "nilpotent" if there exists an integer m such that $A^m = 0$ ("nilpotent" means it has the potential to become null, zero). The smallest m for which $A^m = 0$ is called the "nilpotency index" of A.
   Show that if A is a nilpotent matrix with nilpotency index m, then the matrix $(I - A)$ is regular, with $(I - A)^{-1} = I + A + A^2 + \cdots + A^{m-1}$.
   Hint: Since the inverse matrix is unique, you can "guess" what the inverse matrix is and simply show that it satisfies the definition of the inverse matrix. Here you were told what the inverse matrix is, so "guessing" it shouldn't be hard.
3. Prove that if the system $A\bar{x} = \bar{b}$ has more than one solution, then it has infinitely many.
   Guidance: Suppose that $\bar{u}$ and $\bar{v}$ are two different solutions. Use them to construct infinite different solutions for the system.