Question 1.[1] *(5 marks)* Solve for the matrix X if $(D+XB)^{-1}XA = (ED)^{-1}$. Assume that all matrices are $n \times n$ and invertible as needed.

Question 2.*(4 marks)* Show that if A is a square matrix such that $A^k = 0$ for some positive integer k, then the matrix $I - A$ is invertible and $(I-A)^{-1} = I + A + A^2 + \cdots + A^{k-1}$

Question 3.*(3 marks)* Determine whether the following statement is true or false. If the statement is false provide a counterexample. If the statement is true provide a proof of the statement.

The sum of two invertible matrices of the same size must be invertible.

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[1] based on a WeBWorK problem