Assignment 4 for Math 2370

The due date for this assignment is Thursday October 3, 2019.

1. Construct two 2×2 matrices A and B such that $AB = 0$ but $BA \neq 0$.

2. Let $D = [d_1, d_2, \cdots, d_n]$ be a given diagonal matrix where d_i, $i = 1, \cdots, n$ are distinct numbers. Find the necessary and sufficient condition for the matrix A so that

$$AD = DA.$$

3. Suppose that A, B and $A + B$ are invertible, show that $A^{-1} + B^{-1}$ is also invertible.

4. Let p be the permutation such that $p_k = n - k + 1$ for $1 \leq k \leq n$. Find $\sigma(p)$.

5. Let A, B, C be $n \times n$ matrices, is it always true that

$$\operatorname{tr} ABC = \operatorname{tr} ACB?$$