Math 54 – Worksheet 4

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Problem 1. Verify by hand the the inverse of the matrix $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ is

$$\frac{1}{ad-bc} \begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$$

Problem 2. Find the inverse (if it exists) of

$$\begin{pmatrix} 1 & -2 & -1 \\ 0 & 3 & 5 \\ 0 & 6 & 10 \end{pmatrix}$$

Problem 3. Find the inverse (if it exists) of

$$\begin{pmatrix} 1 & 0 & -2 \\ -3 & 1 & 4 \\ 2 & -3 & 4 \end{pmatrix}$$

Problem 4. Find the inverse (if it exists) of

$$\begin{pmatrix} 1 & 0 & 0 & 0 \\ 1 & 1 & 0 & 0 \\ 1 & 1 & 1 & 0 \\ 1 & 1 & 1 & 1 \end{pmatrix}$$

Problem 5. Find the inverse of $A = \begin{pmatrix} 1 & 2 \\ 0 & 4 \end{pmatrix}$ and $B = \begin{pmatrix} -2 & 3 \\ -1 & 2 \end{pmatrix}$. Then compute the inverse of their product: AB.

These problems don't have to do with inverses, but you need to know how to solve them

Problem 6. Consider the set of all real values x, y, z, w such that 2x - 2z + w = 0 and y - w = 0. Call this set S.

- 1. Find a matrix A such that S = null(A).
- 2. Determine the dimension of the kernel of A and the dimension of the column space of A (also known as the rank of A).

Problem 7. Find a basis for \mathbb{R}^4 , that contains the following vectors:

$$\left\{ \begin{pmatrix} 1\\1\\1\\0 \end{pmatrix}, \begin{pmatrix} 0\\1\\1\\0 \end{pmatrix}, \begin{pmatrix} -3\\0\\0\\3 \end{pmatrix} \right\}$$