

Practice Midterm 1

Problem 1. Find the inverse of the matrix

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 1 & -2 \\ 1 & 0 & -2 \end{bmatrix}$$

Problem 2. Find the rank of the matrix

$$B = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 2 & 4 & 7 & 9 \\ -1 & -2 & -2 & -3 \end{bmatrix}$$

Problem 3. Find b so that the vector $\begin{bmatrix} 1 \\ b \\ 1-b \end{bmatrix}$ belongs to the span of $\begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}$ and $\begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix}$.

Problem 4. Compute (or if undefined say so, explaining why)

a) $\begin{bmatrix} 1 & 2 \\ 2 & 1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} 2 & 3 \\ 1 & -2 \\ 0 & -2 \end{bmatrix}$ b) A^7 , $A = \begin{bmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ c) $[1 \ 2 \ 4] \begin{bmatrix} 1 \\ 2 \\ 4 \end{bmatrix}$ d) $\det \begin{bmatrix} 1 & 4 & 2 \\ 1 & -4 & 2 \\ 1 & 1 & 1 \end{bmatrix}$

Problem 5. TRUE or FALSE (justify your answers)

- Row operations preserve the column space of a matrix.
- If A and B are two square matrices so that AB is invertible then A and B are both invertible.
- If A is a 5×8 matrix with $\dim \text{Nul } A = 4$ then $\dim \text{Nul } A^T = 1$.
- If W_1 and W_2 are subspaces of V then $W_1 \cup W_2$ is also a subspace.
- If v_1, v_2, v_3 are linearly independent then $v_1, v_2 + v_3, v_2 - v_3$ are also linearly independent.