Math 54 Section Worksheet 6

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Office Hours: Monday 3:30-5:30pm, Evans 1047
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1 Warm-up

1. Find the inverse of the matrix $A = \begin{pmatrix} 2 & 3 \\ 3 & 4 \end{pmatrix}$ **without** using some memorized formula for the inverse.
2. Find some people. One of you define *column space*, one of you define *null space* one of you define *basis*, and one of you define *dimension*.

2 Problems

1. Let $A = \begin{pmatrix} 1 & 5 & -4 & -3 & 1 \\ 0 & 1 & -2 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{pmatrix}$. Find an explicit description of Nul A by listing vectors that span the null space.
2. Let $A = \begin{pmatrix} 4 & 10 \\ -6 & -15 \end{pmatrix}$ and $w = \begin{pmatrix} 2 \\ -3 \end{pmatrix}$. Determine if w is in Col A and if w is in Nul A.
3. Calculate the inverse of $A = \begin{pmatrix} 3 & 1 & 0 \\ 0 & -2 & 1 \\ 1 & -1 & 1 \end{pmatrix}$.
4. Calculate the determinant of $A = \begin{pmatrix} 1 & -1 & 3 \\ 2 & 0 & 1 \\ 0 & -2 & 4 \end{pmatrix}$ in two different ways: (a) by cofactor expansion, and (b) by row reducing.
5. True or False?
   (a) A row replacement operation does not affect the determinant of a matrix.
   (b) The determinant of A is the product of the pivots in any echelon form U of A, multiplied by $(-1)^r$, where r is the number of row interchanges made during row reduction from A to U.
   (c) If the columns of A are linearly dependent, then $\det A = 0$.
   (d) $\det(A + B) = \det A + \det B$.
   (e) If three row interchanges are made in succession, then the new determinant equals the old determinant.
   (f) The determinant of A is the product of the diagonal entries in A.
   (g) $\det A^{-1} = -\det A$.