MATH 215
Practice -Exam 2

1. Find the inverse of the given matrices. Show **ALL** row operations that you used.

a) $A = \begin{bmatrix} 4 & -3 \\ 8 & -1 \end{bmatrix}$

b) $A = \begin{bmatrix} 1 & 2 & 1 \\ 3 & 1 & 4 \\ 2 & 2 & 4 \end{bmatrix}$

c) Using the inverse of the matrix $A = \begin{bmatrix} 1 & 2 & 1 \\ 3 & 1 & 4 \\ 2 & 2 & 4 \end{bmatrix}$ from part b) above solve $Ax = b$, where $b = \begin{bmatrix} 1 \\ 0 \\ 2 \end{bmatrix}$

$$A = \begin{bmatrix} 1 & 2 & 4 \\ -2 & -3 & -5 \\ 2 & 1 & -1 \end{bmatrix} \quad \text{and} \quad B = \begin{bmatrix} 1 & 4 & -2 \\ 2 & 7 & -1 \\ 2 & 9 & 7 \end{bmatrix}$$

2. Using **cofactor expansion across the first row** to compute the determinant of A.

3. Using **cofactor expansion down last column** to compute the determinant of B.

4. Using row operations combined with cofactor expansion, compute the determinant of A

5. Using row operations combined with cofactor expansion, compute the determinant of B

6. What is the determinant of AB? What is the determinant of A^T?

7. Matrix A invertible? Matrix B invertible? Do the columns of A span $\mathbf{R}^3$?
   Are the columns of B linearly independent?

(Same matrices A and B from page 2)

$$A = \begin{bmatrix} 1 & 2 & 4 \\ -2 & -3 & -5 \\ 2 & 1 & -1 \end{bmatrix} \quad \text{and} \quad B = \begin{bmatrix} 1 & 4 & -2 \\ 2 & 7 & -1 \\ 2 & 9 & 7 \end{bmatrix}$$

8. Compute the product AB.

9. Compute A^T and B^T and the product $(AB)^T$.

10. (Section 6.1) Let $u = \begin{bmatrix} -3 \\ 0 \\ 1 \end{bmatrix}$ and $v = \begin{bmatrix} 2 \\ 1 \\ 4 \end{bmatrix}$.

    Compute $u^T u$, uu^T, $u^T v$, $v^T u$, vu^T, uv^T, $\|u\|$, $\|v\|$, and the angle between u and v.