Instructions: Solve each problem carefully on separate paper. To receive full credit, you must show all work. In addition, your work must be organized, legible, and include units and complete sentences where appropriate.

1. Let B be the matrix below

$$B = \begin{bmatrix} 4 & 2 & -1 \\ 3 & 1 & 0 \\ 2 & -3 & 1 \end{bmatrix}$$

   (a) Find $\det(B)$ by using cofactor expansion across the first row.

   (b) Find $\det(B)$ by using cofactor expansion down the third column.

2. Consider the matrix below:

$$A = \begin{bmatrix} 1 & 2 & 3 & 0 \\ 5 & 7 & 0 & 11 \\ -1 & 2 & -3 & 4 \\ 6 & 0 & 6 & 0 \end{bmatrix}$$

   (a) If A is labeled the standard way, find a_{23}, A_{23} and C_{23}.

   (b) Find the determinant of A.

3. Find the determinant of the following matrix. Try to do this as efficiently as possible, by choosing columns and rows that simplify cofactor expansion.

$$\begin{bmatrix} 0 & 0 & -7 & 3 & -5 \\ 0 & 0 & 2 & 0 & 0 \\ 7 & 3 & -6 & 4 & -8 \\ 5 & 0 & 5 & 2 & -3 \\ 0 & 0 & 9 & -1 & 2 \end{bmatrix}$$

4. Give an example of a 3×3 matrix that has a determinant of 42.