Group #: _____ Members: _____ Rating: _____

1. (3 points) Determine whether
$$A = \begin{bmatrix} 0 & 3 & -5 \\ 1 & 0 & 2 \\ -4 & -9 & 7 \end{bmatrix}$$
is invertible. Provide 6 distinct reasons to justify your answer.

2. (3 points) Let U be a square matrix such that $U^T U = I$. A matrix that satisfies this property is called an *orthogonal matrix*. Show that $\det U = \pm 1$. Try to come up with such a matrix U that is not the identity matrix.

3. (2 points) Find the determinant of the following matrix by row reduction to echelon form. Show all work.
$$A = \begin{bmatrix} 1 & 3 & -1 & 0 & -2 \\ 0 & 2 & -4 & -1 & -6 \\ -2 & -6 & 2 & 3 & 9 \\ 3 & 7 & -3 & 8 & -7 \\ 3 & 5 & 5 & 2 & 7 \end{bmatrix}$$

4. **True/False.** Remember to justify your answers to the following statements.
   (a) (1 point) $\det(A + B) = \det A + \det B$.
   (b) (1 point) If $\det A = 0$, then the columns of A are linearly independent.