1. Use determinants to decide if \[
\begin{bmatrix}
0 & -6 \\
1 & -2 \\
\end{bmatrix}, \quad
\begin{bmatrix}
0 & 4 \\
-2 & 3 \\
\end{bmatrix}, \quad \text{and} \quad
\begin{bmatrix}
-8 & \\
-4 & 3 \\
\end{bmatrix}
\] are linearly independent.

2. Find a basis for the Col \( A \) and Nul \( A \), where \( A = \begin{bmatrix}
1 & 2 & 3 & 4 \\
5 & 6 & 7 & 8 \\
6 & 7 & 8 & 4 \\
\end{bmatrix} \).

3. Find a \( 3 \times 3 \) matrix, using homogenous coordinates, which rotates the \( xy \)-plane by \( 90^\circ \) counterclockwise about the point \((1, 0)\).

4. Find inverse of the matrix \[
\begin{bmatrix}
1 & 5 & 0 \\
-2 & -7 & 6 \\
1 & 3 & -4 \\
\end{bmatrix}
\] if it exists.

5. True or False: Justify your answers. This means that you should give a proof if the answer is affirmative, or produce a counterexample otherwise.

   (a) Let \( A \) be an \( m \times n \) matrix. Then the linear transformation \( T: \mathbb{R}^n \rightarrow \mathbb{R}^m \), given by \( T(x) = Ax \) is one to one provided that \( \text{Rank}(A) = n \). (Hint: use the rank theorem).

   (b) In \( \mathbb{R}^2 \) rotations and reflections always commute.

   (c) If we rescale the \( x \)-axis in \( \mathbb{R}^2 \) by a factor of 2 and the \( y \)-axis by a factor of 3, then the area of every region in \( \mathbb{R}^2 \) changes by a factor of 6.

   (d) If \( A \) and \( P \) are square matrices with \( P \) invertible, then \( \det(PAP^{-1}) = \det A \).

Problems 1 to 4 are worth 15 points each, and 5 is worth 40 points.