

# Math 54 Discussion Section Problems

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You should work on the following problems in groups of 3 or 4. Try to get through as many as you can, but you aren't expected to finish everything. In fact, the answers are largely unimportant; making sure **everyone** in your group knows **how** to solve all the problems is what really matters.

1. Use row reductions to evaluate  $\begin{vmatrix} 0 & 1 & 5 & 4 \\ 1 & -1 & -3 & 0 \\ -1 & 2 & 8 & 5 \\ 3 & -1 & -2 & 3 \end{vmatrix}$  by putting it in Echelon form.

2. Can a 6x9 matrix have a null space of dimension 2? If yes, give an example of such a matrix. If not, explain.

3. If  $A$  is an  $n \times n$  matrix, what is the relationship between  $\det A$  and  $\det (3A)$ ?

4. (a) Suppose someone tells you that a matrix  $A$  can be row reduced to  $\begin{bmatrix} 3 & 2 & 4 \\ 0 & 1 & -2 \\ 0 & 0 & 4 \end{bmatrix}$ . Can you find  $\det A$ ? If yes, find it; if not, explain why.

(b) Repeat part (a) for a matrix that can be reduced to  $\begin{bmatrix} 3 & 2 & 4 \\ 0 & 1 & -2 \\ 0 & 0 & 0 \end{bmatrix}$

5. Use determinants to decide whether  $\begin{bmatrix} 7 \\ -4 \\ -6 \end{bmatrix}$ ,  $\begin{bmatrix} -8 \\ 5 \\ 7 \end{bmatrix}$ ,  $\begin{bmatrix} 7 \\ 0 \\ -5 \end{bmatrix}$  are linearly dependent or independent.