MATH 2270: QUIZ 5

1. (4 points) Let $A = \begin{pmatrix} 3 & 0 & 4 \\ 2 & 3 & 2 \\ 0 & 5 & -1 \end{pmatrix}$. Fill in the blanks:

$|\det A|$ is the volume of the parlellepiped spanned by the 3 vectors _____.

If $\det A \neq 0$ then A must have _____ pivots.

Now compute $\det A$ by expanding by the **2nd column**.

2. (2 points) Suppose that A is a 4 by 4 matrix. Mary row reduces A by doing the following:

First she switches rows 1 and 3, then she replaces row 2 with row 1 - 3$*$(row 2). Then she switches rows three and 4. Next she replaces row 4 with 6*Row 1 + row 4. Finally, she divides row three by 2. The resulting matrix is

$$\begin{pmatrix} 1 & 5 & 0 & -4 \\ 0 & -1 & 3 & 6 \\ 0 & 0 & 4 & 3 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

Compute $\det A$.

3. (4 points)

A) Suppose that A and B are $n \times n$ matrices. If $det(AB) = 0$, is it true that either $det(A)$ or $det(B) = 0$?

B) $det(A + B)$ is **NOT** the same as $\det(A) + \det(B)$ in general. Write down two 2×2 matrices A, B to illustrate that they are not necessarily the same (Hint: You can do it so that $\det(A) = \det(B) = 0$, but $\det(A + B) = 1$)

4. (Extra credit! 1 point) Explain why you can easily see that the following matrix has determinant 0:

$$\begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 5 \\ 101 & 102 & 103 & 104 & 105 & 105 \\ 1001 & 1002 & 1003 & 1004 & 1005 & 1005 \\ -1 & -2 & -3 & -4 & -5 & -5 \\ 0 & 1 & 0 & 1 & 0 & 0 \\ 5 & 5 & 5 & 5 & 5 & 5 \end{pmatrix}$$

(Hint: Don't even think about trying to expand by a row or column - think about the properties!)