1. Suppose \( \det(A) = 600 \) where \( A = \begin{bmatrix} 5 & y & 2 & 4 \\ 0 & 0 & w & 0 \\ 0 & 10 & 9 & 7 \\ 0 & 0 & 6 & 3 \end{bmatrix} \).

1A. Find \( A_{2,3} \).  
1B. Find \( \det(A_{2,3}) \).

1C. Find \( w \) (notice there are a lot of zeros in its row).

1D. Does finding \( \det(A) \) by expansion across either the first row or down the second column tell you what \( y \) is? Explain.

1E. **Bonus:** Find \( y \).

2. Let \( B = \begin{bmatrix} a & b & c \\ 5 & 6 & 7 \\ m & n & p \end{bmatrix} \); suppose \( \det(B) = 3 \)

Find the determinant of each of the following matrices, and under each matrix write the reason/rule/fact about determinants of matrices you used to find the det. (eg, “swapping rows changes the sign of the det” or “the determinant of the derivative of a matrix is the matrix of its integral” (this second fact is nonsense)

2A. \( \begin{bmatrix} a + 20 & b + 24 & c + 28 \\ 5 & 6 & 7 \\ m & n & p \end{bmatrix} \) the det is:  
2B. \( \begin{bmatrix} a & 5 & m \\ b & 6 & n \\ c & 7 & p \end{bmatrix} \) the det is:

2C. \( \begin{bmatrix} a & b & c \\ 20 & 24 & 28 \\ m & n & p \end{bmatrix} \) the det is:  
2D. \( \begin{bmatrix} a & b & c \\ 5 & 6 & 7 \\ a & b & c \end{bmatrix} \) the det is:

2E. \( 4B \) the det is:  
2F. \( B^{-1} \)

*Hint for 2F:* You know \( BB^{-1} = I_3 \), so both sides of this equation must have the same determinant. But you know two out of three of the determinants involved.

3. Suppose \( U = \begin{bmatrix} 4 & 6 & 2 \\ 0 & 3 & 7 \\ 0 & 0 & 5 \end{bmatrix} \). Suppose \( C \) is row equivalent to \( U \) and the elementary row operations which produce \( U \) from \( C \) are:

a) one row swap.  
b) a multiple of one row is added to another and *this is done 3 times*.  
c) one row operation involves dividing a row by 4  
d) one row operation involves multiplying a row by 5.

3A. What is the determinant of \( C \)?

3B. Explain why you do NOT need to know the exact order in which these row operations are performed in order to find \( \det(C) \).