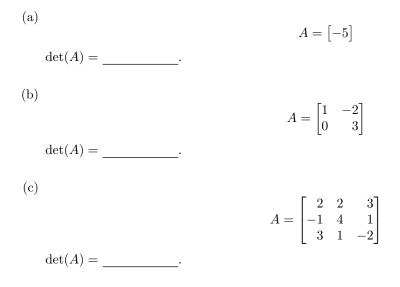
## Practice #9 - Linear Algebra

1. Compute the determinant of the following matrices.



2. Find the determinant of a  $5\times 5$  diagonal matrix whose diagonal entries are 1,2,3,4,5.

3. Find the determinant of a  $5 \times 5$  upper triangular matrix whose diagonal entries are all ones.

4. Find the determinant of a  $5 \times 5$  lower triangular matrix whose diagonal entries are all ones.

5. Find the determinant of an identity matrix  $I_5$  in which row 2 and row 3 have been swapped.

6. Find the determinant of an identity matrix  $I_5$  that has its rows in reverse order, so that the diagonal goes from the lower right to the upper left.

7. Find the indicated quantity for the following matrix A

$$A = \begin{bmatrix} 3 & -4 & 0 & 5\\ 2 & 1 & -7 & 1\\ 0 & -3 & 2 & 2\\ 5 & 8 & -2 & -1 \end{bmatrix}$$

(a)  $M_{23} =$ 

- (b) the minor of  $a_{31}$
- (c)  $C_{43}$
- (d) A co-factor expansion about row 3.

8. Let  $I_5$  be the 5 × 5 identity matrix. What is det $(-2I_5)$ ?

9. Suppose det(A) = 6 and det(AB) = 21. What is the determinant of B?

10. Let A be a  $5 \times 5$  matrix whose determinant is 35. Now swap rows 1 and 2 of A to get a matrix B. What is the determinant of the matrix B? (Hint : Try this out on the matrix in Problem 1b.)

11. Let A be a square matrix and let B be the echelon form of A. What do you guess is the relationship between det(A) and det(B).

12. Suppose that A has an LU factorization, so that A = LU, where L is a lower triangular matrix with all ones on the diagonal and U is an upper triangular matrix. What would be an easy way to compute det(A) using this factorization?