<u>Section 2.1 (Determinants by Cofactor Expansion) Overview and To-Do List</u>

Chapter 2 deals with the determinant of a matrix A, denoted $\det(A)$. The determinant of a 3 x 3 matrix was introduced in Calculus II where it was used to find the cross project of two vectors. Hence, it is somewhat familiar to us.

This $\det(A)$ turns out to be a real number which is a sum of all possible (with either a + or – sign affixed)

elementary products of A , $\sum \pm a_{1j_1} a_{2j_2} a_{3j_3} \ldots a_{nj_n} = \det(A)$,

where an elementary product contains one and only one element from each row and one and only one element from each column. (This is highlighted in Example 7 and the material right before it.) The text highlights various ways one can calculate *det (A)*.

Det (A) is used as a tool to:

(a) determine if a matrix in invertible.
(b) solve certain systems of n equations in n unknowns without row reduction.

Work through the examples of this section. Note that the arrow technique of Example 7 cannot be extended to matrices that are *4 x 4* or larger.

Them 2.1.2 states that it is easy to find *det (A)* when A is triangular (which includes the diagonal matrices). In this case $\det(A) = a_{11}a_{22}a_{33} \cdots a_{nn}$. **Example 6** indicates why this happens in the 3 x 3 case.

Read Section 2.1.
Do problems 1, 3, 9, 11, 13, 21, 22.
Video: determinant of a 3 x 3 matrix
https://youtu.be/ROFcVgehEYA
Work Check Quiz 10
Do later problems 23, 25, 29-30