Date: 2020-09-23

Announcements:

Oct2 , Friday, Test CH2: 2.1, 2.2, 2.3
HW: 2.2 1-21 Odd

Example 1 (Determinant of 4x4)**.**

$$det(A) = |A|$$

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

$$\begin{bmatrix} + & - & & \\ & + & & \\ & - & & \\ & + & & \end{bmatrix}$$

$$det(a) = -2 \begin{bmatrix} 2 & -1 & 5 \\ 3 & 1 & 4 \\ 0 & 2 & -1 \end{bmatrix} + 0 = 0 + 1 \begin{bmatrix} 1 & 0 & 1 \\ 2 & -1 & 5 \\ 3 & 1 & 4 \end{bmatrix}$$

$$= -2\left[0 - 2(8-15) - 1(2+3)\right] 1 \left[1(-4-5) - 0 + 1(2+3)\right]$$

$$= -2(14-5) + (-9+5) = -22$$

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Theorem 1 (Determinant of triangular matrix)**.** *If A is an $n \times n$ triangular matrix (upper, lower, diagonal), then the $det(A)$ is the product of the entries on the main diagonal.*

$$detA = a_{11}a_{22}a_{33}\dots a_{nn}$$

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0.1 Evaluating Determinants by Row Reduction

Theorem 2. *Let A be an $n \times n$ matrix. If A has a row of zeros, then $detA = 0$* •

Theorem 3. *Let A be an $n \times n$ matrix. Then $detA = det(A^T)$* •

Theorem 4. *Let A be an $n \times n$ matrix.*

1. *If B is the matrix that results when a single row or single column of A is multiplied by a scalar k, then*
$$detB = kdetA.$$

2. *If B is the matrix that results when two rows or two columns of A are interchanged, then*
$$detB = -detA.$$

3. If B is the matrix obtained when a multiple of one row or one column is added to another, then

$$detB = detA$$

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Example 2.

$$A = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 3 & 6 & 7 & 1 \\ 4 & 8 & 9 & 2 \\ 5 & 3 & 1 & 7 \end{bmatrix}$$

find $detA$ •