BE - Geometry I   MONDAY   4-16-12

ACT practice ① Simplify $\dfrac{3x^2-8x+4}{x^2-4}$

ANS/ ① $3x^2-8x+4$

Sum = -8
prod = 12
-2 -6

$3x^2-2x-6x+4$

$x(3x-2)+-2(3x-2)$

$(x-2)(3x-2)$

x^2-4

$(x-2)(x+2)$

DIFF. OF Sq's
⇒ CONJUGATE FACTORS

$$\therefore \frac{(x-2)(3x-2)}{(x-2)(x+2)}$$

$$= \boxed{\frac{3x-2}{x+2}}$$

WATCH OUT FOR x^2-1

MATRIX (pl. matrices) — A Rectangular Arrangement of numbers in rows ⟷ and columns ↕.

Symbol [ ]

Named by $\underbrace{\text{rows and columns}}_{\text{DIMENSIONS}}$

EX $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ is a $\underset{R \times C}{2 \times 2}$ matrix

$B = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$ is 2×3 matrix

Row 1 is 1 2 3

Row 2 is 4 5 6

Column 1 is $\begin{matrix} 1 \\ 4 \end{matrix}$

Column 2 is $\begin{matrix} 2 \\ 5 \end{matrix}$

Column 3 is $\begin{matrix} 3 \\ 6 \end{matrix}$

Each position in a matrix can be identified by its row and column

$$\begin{bmatrix} X_{11} & X_{12} & X_{13} \\ X_{21} & X_{22} & X_{23} \end{bmatrix}$$

ADDING MATRICES $\Rightarrow$ "like to like"

They must have same dimensions or the operation is undefined.

(Ex) $A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$ $\quad B = \begin{bmatrix} 7 & 8 & 9 \\ 6 & -2 & 3 \end{bmatrix}$

$$A + B = \begin{bmatrix} 8 & 10 & 12 \\ 10 & 3 & 9 \end{bmatrix}$$

SCALAR A Number

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multiplying a matrix by a scalar means multiply every element by the scalar

(EX) $C = \begin{bmatrix} -1 & 4 \\ 0 & 3 \end{bmatrix}$

$$2C = 2\begin{bmatrix} -1 & 4 \\ 0 & 3 \end{bmatrix} = \begin{bmatrix} -2 & 8 \\ 0 & 6 \end{bmatrix}$$

Multiplying Matrices — tricky

- MUST MATCH columns of 1st with rows of 2ND or UNDEFINED

(Ex) $[1 \times 2] \cdot [2 \times 3]$

OK

resulting matrix is 1×3

(Ex) $[4 \times 3] \cdot [3 \times 1]$

OK

resulting "product" matrix is 4×1

(Ex) $\begin{bmatrix} 2 & 4 \\ 3 & 1 \\ 6 & 2 \end{bmatrix} \cdot \begin{bmatrix} 1 & 5 & -2 & 6 \\ 0 & 5 & 8 & -1 \end{bmatrix}$

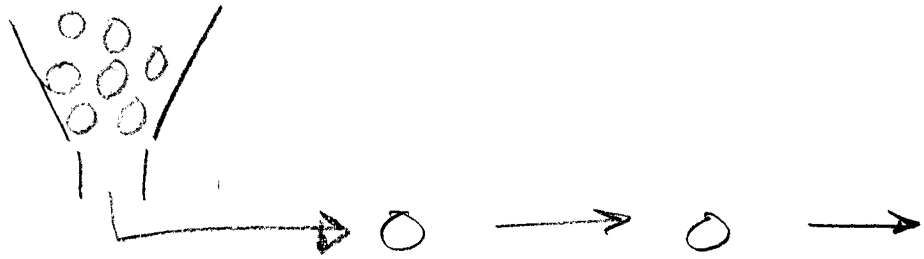
$[3 \times 2] \cdot [2 \times 4]$

OK $\Rightarrow$ PRODUCT $\Rightarrow [3 \times 4]$

(Ex) $[2 \times 3] \cdot [2 \times 3]$

UNDEFINED

Ex use "tennis ball hopper" analogy



$\overline{\text{Ex 3}}$
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$$\begin{bmatrix} 3 & -2 \\ 0 & 6 \end{bmatrix} \cdot \begin{bmatrix} -1 & 5 \\ 6 & -3 \end{bmatrix}$$

CK

$[2\times2]\cdot[2\times2]$

OK, PRODUCT is $[2\times2]$

MAKE 2^{ND} MATRIX THE "hopper" by rotating 90° CCW

$$\begin{matrix} 5 & -3 \\ -1 & 6 \end{matrix}$$

MULTIPLY AND ADD FOR EACH NEW POSITION

$$\begin{bmatrix} 3 & -2 \\ 0 & 6 \end{bmatrix} \Rightarrow \begin{bmatrix} -1\cdot3+6\cdot-2 & 5\cdot3+-3\cdot-2 \\ -1\cdot0+6\cdot6 & 5\cdot0+-3\cdot6 \end{bmatrix}$$

$$\boxed{\begin{bmatrix} -15 & 21 \\ 36 & -18 \end{bmatrix}}$$

$[2\times2]$ ✓

A basic property of any square matrix is its determinant. Symbol $| \quad |$

By definition, the determinant of any 2×2 matrix is:

$$\begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc$$

(Ex) $\begin{vmatrix} 3 & 6 \\ -2 & 8 \end{vmatrix} = ?$

$\begin{vmatrix} 3 & 6 \\ -2 & 8 \end{vmatrix}$ $(3 \cdot 8) - (6 \cdot -2)$

$+ \quad -$

$24 - (-12) = \boxed{36}$

Homework: Page 753 # 13-23 ODD