

BE - Geometry I | Monday 4-4-11

ACT
PRACTICE

① Simplify $\frac{3x^2 - 8x + 4}{x^2 - 4}$

<u>Ans</u> ①	$3x^2 - 8x + 4$	$x^2 - 4$
	$Sum = -8$	$(x-2)(x+2)$
	$prod = 12$	Diff. of Signs
	$-2 \quad -6$	$\Rightarrow$ conjugate factors

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

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

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

WATCH OUT For $x^2 - 1$

MATRIX
(pl. matrices)

A Rectangular Arrangement
of numbers in rows and columns.

Symbol $[]$

Named by rows and columns
DIMENSIONS

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

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

Row 1 is 1 2 3

Row 2 is 4 5 6

Column 1 is 1
4

Column 2 is 2
5

Column 3 is 3
6

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

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

2.

Adding
MATRICES $\Rightarrow$ "like to like"
They must have same
dimensions or the operation
is undefined.

$$\textcircled{\text{EX}} \quad A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \quad B = \begin{bmatrix} 7 & 8 & 9 \\ 6 & -2 & 3 \end{bmatrix}$$

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

SCALAR A number

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

$$\textcircled{\text{EX}} \quad C = \begin{bmatrix} -1 & 4 \\ 0 & 3 \end{bmatrix}$$

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

Multiplying Matrices — tricky

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

Ⓔ $[1 \times 2] \cdot [2 \times 3]$

OK
resulting matrix is 1×3

Ⓔ $[4 \times 3] \cdot [3 \times 1]$

OK
resulting "product" matrix is 4×1

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

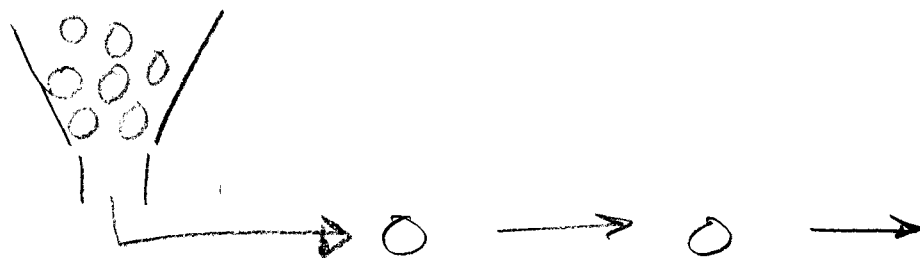
$[3 \times 2] \cdot [2 \times 4]$

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

Ⓔ $[2 \times 3] \cdot [2 \times 3]$

UNDEFINED

⊙ use "tennis ball hopper" analogy



EX3
pg 753

$$\begin{bmatrix} 3 & -2 \\ 0 & 6 \end{bmatrix}$$

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

CK
 $[2 \times 2] \cdot [2 \times 2]$
OK, product
is $[2 \times 2]$

↑
MAKE 2ND
MATRIX THE "hopper"
by rotating 90° CCW

↓

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

MULTIPLY AND ADD
FOR EACH NEW POSITION

$$\begin{bmatrix} 3 & -2 \\ 0 & 6 \end{bmatrix} \Rightarrow$$

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

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

$[2 \times 2] \checkmark$

A basic property of any square matrix is its determinant. Symbol $\begin{vmatrix} & \\ & \end{vmatrix}$

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

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

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

$$\begin{vmatrix} \overset{+}{3} & \overset{-}{6} \\ -2 & 8 \end{vmatrix} = (3 \cdot 8) - (6 \cdot -2) \\ 24 - (-12) = \boxed{36}$$

Homework: Page 753 # 13-23 odd