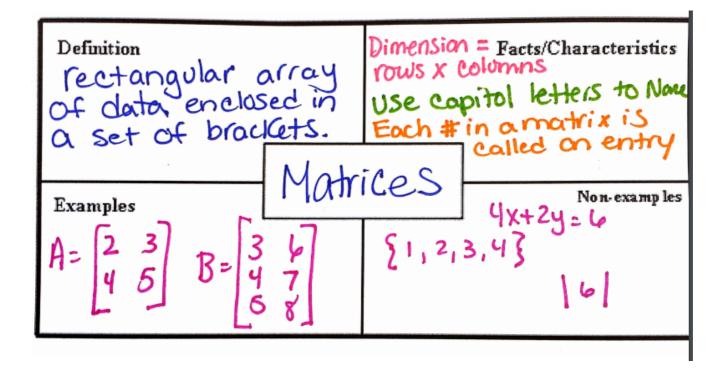
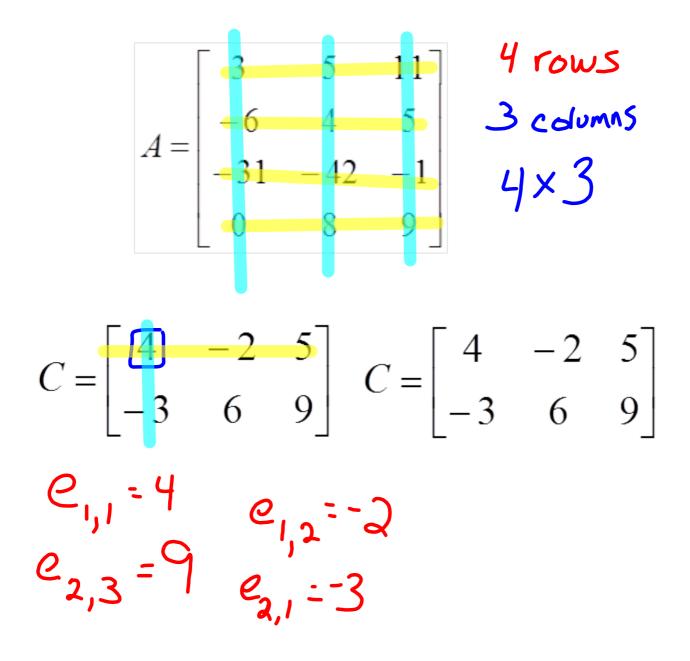
$$(x+2)^{2}$$

 $(x+2)(x+2)$
 $x^{2}+2x+2x+4$
 $x^{2}+4x+4$

-x² when x=-4
-(-4)²
-14
(2)(3)² =
$$2(3)^2$$
 $\Rightarrow .9$

Matrices





To add or subtract matrices, you must have the same

dimensions.

• What is
$$A+B=$$

$$\begin{bmatrix}
3 & 5 & 11 \\
-6 & 4 & 5 \\
-31 & -42 & -1 \\
0 & 8 & 9
\end{bmatrix}$$

$$B = \begin{bmatrix}
32 & 24 & 14 \\
8 & -5 & -14 \\
12 & -7 & 3 \\
-10 & 11 & 6
\end{bmatrix}$$

$$A+B = \begin{bmatrix}
35 & 29 & 25 \\
2 & -1 & -9 \\
19 & -49 & 2 \\
10 & 19 & 15
\end{bmatrix}$$

Scalar Multiplication

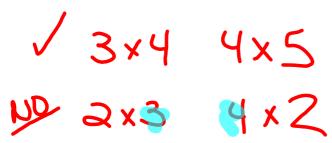
• Scalar Multiplication takes the elements of one matrix and multiplies it by some factor (not the same as multiplying one matrix by another) $\frac{1}{2}C = \begin{bmatrix} 2 & -1 & \frac{5}{2} \\ -3 & 3 & \frac{5}{2} \end{bmatrix}$

Try the following....

$$= \begin{bmatrix} 2 & -2 & 25 \\ -1 & 5 & 19 \end{bmatrix} + \begin{bmatrix} 80 & 64 & 102 \\ -26 & -46 & 24 \end{bmatrix}$$
$$= \begin{bmatrix} 82 & 62 & 127 \\ -27 & -41 & 43 \end{bmatrix}$$

Matrix Multiplication

- Used to multiply one matrix by another matrix dimensions do not have to be the same (but the inside numbers have to match)
- EX. a 2X3 and a 3X4 can be multiplied together and the result will be a 2X4 (outside numbers)



Multiplying Matrices

$$R = \begin{bmatrix} 2 & 3 & 4 \\ -6 & 7 & 4 \\ 10 & 5 & -1 \\ 0 & 3 & -9 \end{bmatrix}$$

$$S = \begin{bmatrix} 2 \\ 3 \\ 11 \end{bmatrix}$$

$$RS = \begin{bmatrix} 3 \times 1 \\ 3 \times 1 \end{bmatrix}$$

$$RS = \begin{bmatrix} 3 \times 1 \\ 3 \times 2 \times 4 \\ 3 \times 3 \times 3 \end{bmatrix}$$

$$SR = \begin{bmatrix} 3 \times 1 \\ 3 \times 3 \times 4 \\ 3 \times 3 \times 4 \end{bmatrix}$$

$$SR = \begin{bmatrix} 3 \times 1 \\ 3 \times 3 \times 4 \\ 4 \times 11 \times 44 \end{bmatrix}$$

$$SR = \begin{bmatrix} 2 \\ 3 \\ 11 \end{bmatrix}$$

$$SR = \begin{bmatrix} 3 \times 1 \\ 4 \times 11 \times 44 \\ 5 \end{bmatrix}$$

$$SR = \begin{bmatrix} 2 \\ 3 \\ 11 \end{bmatrix}$$

$$SR = \begin{bmatrix} 3 \times 1 \\ 4 \times 11 \times 44 \\ 5 \end{bmatrix}$$

$$SR = \begin{bmatrix} 3 \times 1 \\ 4 \times 11 \times 44 \\ 5 \end{bmatrix}$$

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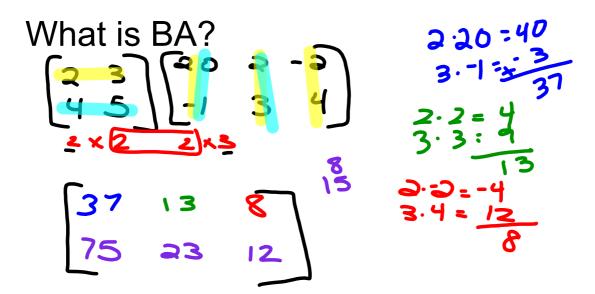
$$SR = \begin{bmatrix} 3 \times 1 \\ 4 \times 11 \times 44 \\ 5 \end{bmatrix}$$

$$SR = \begin{bmatrix} 3 \times 1 \\ 4 \times 11 \times 44 \\ 5 \end{bmatrix}$$

$$SR = \begin{bmatrix} 3 \times 1 \\ 5 \times 3 \times 15 \\ -1 \times 11 \times 11 \\ -1 \times 11 \end{bmatrix}$$

You try....

$$A = \begin{bmatrix} 20 & 2 & -2 \\ -1 & 3 & 4 \end{bmatrix} \quad B = \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$$



Is AB possible?

Solving for unknowns in a matrix

 Two matrices are equal if they have the same dimensions and the corresponding entries are equivalent

$$\begin{bmatrix} 2x+4 & 5 \\ -2 & -3y+5 \end{bmatrix} = \begin{bmatrix} 12 & 5 \\ -2 & 5y-3 \end{bmatrix}$$

$$2x+4 = 12$$

$$2x=8$$

$$x=4$$

$$x=4$$

$$x=4$$

$$x=4$$

$$x=5$$

Solving systems with matrix equations

- A financial manager wants to put \$50,000 in an investment for a client, some in a low risk one earning 5% and some in a high risk one earning 14%. How much money should be invested at each interest rate to earn \$5000 in interest per year?
- Set up system: Let x represent the amount in the low earning investment and y represent the amount in the high earning investment
- X+Y=50000
- .05x+.14y=5000

Set up Matrix equation

$$A = \begin{bmatrix} 1 & 1 \\ .05 & .14 \end{bmatrix} \quad x = \begin{bmatrix} x \\ y \end{bmatrix} \quad B = \begin{bmatrix} 50000 \\ 5000 \end{bmatrix}$$

 If A represents the coefficients of your variables, X represents the variables, and B represents the constants, then...

$$\frac{1}{10000}$$

$$\frac{1}{10000}$$

$$\frac{1}{10000}$$

$$\frac{1}{10000}$$

$$\frac{1}{10000}$$

$$\frac{1}{10000}$$

• To solve for x, you would divide by A (which is the same as multiplying by the inverse)--do this on both sides

SOLVING SYSTEMS WITH MATRICES

120d Matrix

- 2. D To edit
- dimensions and all entries.
- 4. Repeat until you have entered all matrices.
- 5. 2nd Quit (home screen)
- 6. 2nd Natrix [1: [A]
- 7. X-1
- 8. 20 Matrix 2: [6]
- 9. entr

Solve this using matrix equations

$$\frac{1}{3}r + \frac{2}{3}s = 5$$

$$\frac{2}{3}r + \frac{2}{3}s = 5$$

$$\frac{2}{3}r - \frac{1}{2}$$

$$\frac{2}{3}r - \frac{1}{2}$$

$$\frac{2}{3}r - \frac{1}{2}$$

$$\frac{2}{3}r - \frac{1}{2}$$

Solve using matrices

$$x + y + z = 6$$

$$2x + y - 4z = -15$$

$$5x - 3y + z = -10$$

$$\begin{cases} 2 & (3) \\ 2 & (3) \end{cases} = \begin{cases} 3 & (3) \\ 3 & (3) \end{cases}$$