Section 4-7:

Solving a system of equations using matrices

Enter the following matrix as [B]

9

2

Entering Matrices on the Ti-84:

Enter this matrix as [A] on the calc.

Multiply the two matrices:

Find each:

1. [A][B]
$$\begin{bmatrix} 42 \\ 40 \end{bmatrix}$$

To multiply matrices:

$$\begin{bmatrix} 4 & 3 \\ 4 & 2 \end{bmatrix} \cdot \begin{bmatrix} 9 \\ 2 \end{bmatrix}$$

$$2 \times 2 \qquad 2 \times 1$$

[A]•[B]

of columns of the first matrix must match the number of rows in the second matrix. $\begin{bmatrix} 42 \\ 40 \end{bmatrix}$ 2×1

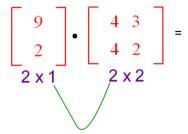
The answer matrix will have the # of rows in the first and the # of columns in the second.

Find the product of this pair of matrices:

$$\begin{bmatrix} 8 & 5 \\ 3 & 0 \\ 7 & 11 \\ -2 & 1 \end{bmatrix} \cdot \begin{bmatrix} 9 \\ 4 \end{bmatrix} = \begin{bmatrix} 9 \\ 27 \\ 107 \\ -14 \end{bmatrix}$$

$$4 \times 2 \quad 2 \times 1 \quad 4 \times 1$$

Trying to multiply matrices:



These don't match so you can't find this product.

Which pair of matrices can be multiplied?

$$A = 3$$
 $2 \times$

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

$$C \left[\begin{array}{rrr} 0 & -4 & 7 \\ 10 & -3 & 5 \end{array} \right]$$



Solve the following equation without using division:

$$\frac{1}{8}.8x = 106 \cdot \frac{1}{8}$$

Write the following expression without negative exponents:

$$w^{-1} = \frac{1}{w}$$

$$w^{-1}$$

Negative Exponent

For every nonzero number a and integer n, $a^{-n} = \frac{1}{n}$.

Now solve this equation without using division or without using fractions.

$$9.5^{-1} \cdot (9.5 \text{ m}) = (22.8) \cdot 9.5^{-1}$$

Solve the following equation

without using division:
$$8x = 106 - 8$$

Instead of multiplying by the reciprocal of $8 \rightarrow \frac{1}{8}$ you could multiply by the inverse of 8. \longrightarrow 8⁻¹

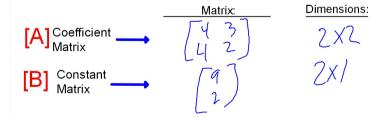
A matrix equation that models a system of linear equations:

Both equations must be in Standard Form

$$4m + 3n = 9$$

$$4m + 2n = 2$$

$$A = \begin{bmatrix} A \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} B \end{bmatrix}$$



Solving the matrix equation:

$$[A]\begin{bmatrix} x \\ y \end{bmatrix} = [B] \qquad ----- \begin{bmatrix} x \\ y \end{bmatrix} = [A]^{-1} \cdot [B] = [A]^{-1} \cdot [A] =$$

You can't divide matrices so how do you move [A] to the other side of the equation?

$$\begin{bmatrix} x \\ y \end{bmatrix} = [B] \cdot [A]$$

$$2 \times 2 \times 2$$
dimensions don't match.

Multiply both sides by the inverse of [A] but because of the dimensions of the two matrices you must do it this way [A]-1[B] Solve each system of linear equations using matrices. Give your answer as an ordered pair. Round any decimals to the nearest hundredth.

1.
$$7R + 8P = 54.2$$
 $M + 3N = 9.3$ $SM - 7N = -10.7$

A $A = 100.8$ $A = 100.$