CHAPTER 8: MATRICES AND DETERMINANTS

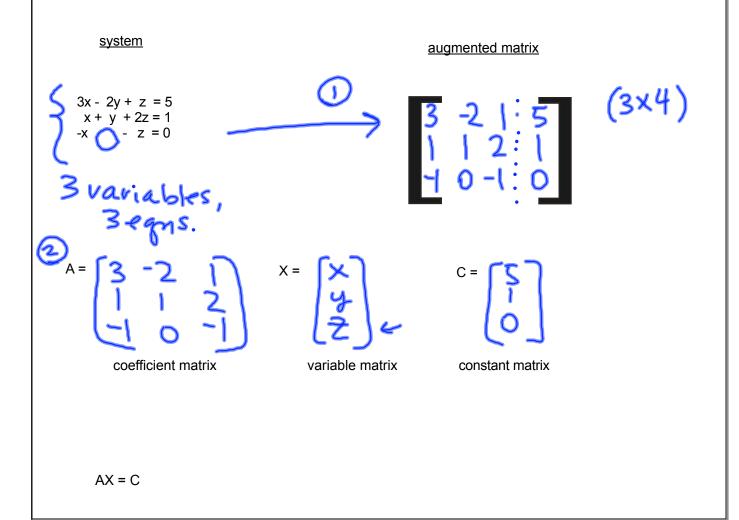
In section 8.1 you will learn to:

- Write a matrix and identify the order.
- Perform elementary row operations on matrices
- Use matrices and Gaussian elimination (row-echelon form) to solve systems of linear equations.
- Use matrices and Gauss-Jordan elimination (reduced row-echelon form) to solve systems of linear equations.

Definition of a matrix:

$$[a_{ij}] = A =$$
 $[a_{i1}] = A =$
 $[a_{i2}] = A =$
 $[a_{i1}] = A =$
 $[a_$

We will use matrices to solve linear systems of equations.



Example 1 -- What is the size (order) of these matrices? Are any of them square?

a)
$$\begin{bmatrix} -2 & 5 & 1 \\ 7 & 6 & 0 \end{bmatrix}$$
 b) $\begin{bmatrix} 1 & 1 & 1 & 1 & 1 & 0 \\ 2 & 3 & 2 & 3 & 1 & 5 \\ 4 & 4 & 7 & 4 & 4 & -1 \\ 9 & 8 & 7 & 6 & 5 & 2 \end{bmatrix}$ c) $\begin{bmatrix} 2 & 3 \\ -1 & 4 \end{bmatrix}$

Gaussian Elimination:

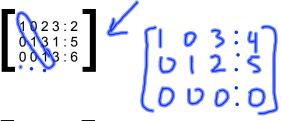
Row-echelon form →

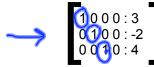
- · All zero rows at the bottom
- · Has a leading 1 in every nonzero row
- · All entries below the leading 1 are zero.

Gauss-Jordan Elimination

Reduced row-echelon form →

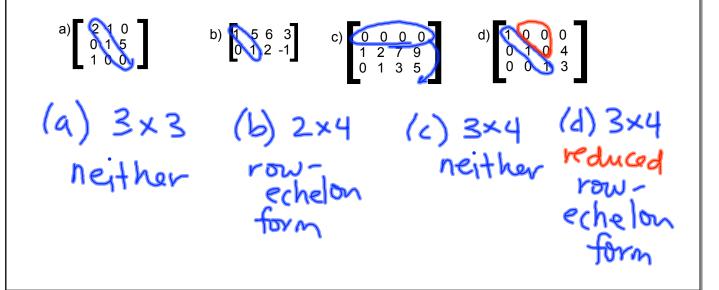
- row-echelon form and
- · all entries above leading 1 are zero





Example 2 - Indicate if these matrices are in

- · @ row-echelon form
- · (b) reduced row-echelon form
- · © neither



Example 3: a) Write the system of equations represented by this augmented matrix.

- b) Write this matrix in row-echelon form.
- c) Back-substitute to solve.

(b) Elementary Row Operations:

(1) Exchange any two rows.

(2) Mu Hiply any row by nonzero constant.

- Add a nonzero multiple of one now to another now, replacing one of the rows w/ the result.
 (elimination step)

