

Name: \_\_\_\_\_

## Worksheet #3 - Row Reduction

In this worksheet, you will use row reduction to solve systems of linear equations.

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1 Consider the following system of linear equations:

$$3x + 2y - z = 1$$

$$2x - 6z = 6$$

$$y + z = 2$$

(a) Write the system as an augmented matrix.

(b) Use your calculator's row-reduction feature to reduce the matrix, and write the result below.

(c) Interpret the output of your calculator's row-reduction operation as solution value for  $x$ ,  $y$  and  $z$ .

(d) Check that the values found in part (c) actually provide a solution of the original system of equations.

2] The following list of matrices represent the steps of a row-reduction process.

(a) Write down the system of linear equations corresponding to the following augmented matrix:

$$\begin{bmatrix} 1 & -2 & 1 & 7 \\ 4 & 0 & -2 & 2 \\ 1 & 2 & 1 & 3 \end{bmatrix}$$

(b) Next to each matrix, write down an explanation of what row-reduction operation was used to obtain it from the previous one. (The first matrix here is obtained from the one in part(a).)

$$\begin{bmatrix} 1 & -2 & 1 & 7 \\ 4 & 0 & -2 & 2 \\ 0 & 4 & 0 & -4 \end{bmatrix}$$

$$\begin{bmatrix} 1 & -2 & 1 & 7 \\ 4 & 0 & -2 & 2 \\ 0 & 1 & 0 & -1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & 1 & 5 \\ 4 & 0 & -2 & 2 \\ 0 & 1 & 0 & -1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & 1 & 5 \\ 0 & 0 & -6 & -18 \\ 0 & 1 & 0 & -1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & 1 & 5 \\ 0 & 0 & 1 & 3 \\ 0 & 1 & 0 & -1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & 0 & 2 \\ 0 & 0 & 1 & 3 \\ 0 & 1 & 0 & -1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & 3 \end{bmatrix}$$

(c) Interpret the values of  $x$ ,  $y$  and  $z$  from the last matrix.

(d) Check the answers from (c) in the original system of equations.