

## Session 1: Enter the Matrix with Coding Activity 0

Please complete and submit scanned images or a PDF of this handout to Schoology at least two hours before our first session.

Before completing these responses, be sure you have watched the videos:

- Introduction to Matrices (12 minutes) - <https://www.youtube.com/watch?v=bDoqKswdp6c>
- Matrix arithmetic (4.5 minutes) - <https://www.youtube.com/watch?v=kqWCwwyeE6k>

To check your learning, complete the following questions. Please perform these calculations by hand. You may check your answers with a calculator or online device. However, be sure that your answer reflects work you have done by hand. Relying only on computers to perform such calculations can reduce the breadth of your research and analysis. We'll get to the coding within our group session together.

1. Find the augmented system for the following system of linear equations:

$$\begin{aligned}2x - y &= 5 \\5x + 2y + z &= 8 \\x - y - z &= 0\end{aligned}$$

$$\left[ \begin{array}{ccc|c} 2 & -1 & 0 & 5 \\ 5 & 2 & 2 & 8 \\ 1 & -1 & -1 & 0 \end{array} \right]$$

2. What advantage do you see, if any, to using an augmented system to represent a system of linear equations? If you don't see an advantage, why?

The augmented system is simpler to understand. It does not involve specific variables (x, y, z) because it only focuses on the coefficients of them. It also provides a unified expression of linear equations.

3. Find the following sum, if possible, and if it isn't possible, explain why:

$$\begin{pmatrix} -1 & 0 & 3 \\ 2 & -4 & 1 \\ 3 & 4 & -2 \end{pmatrix} + \begin{pmatrix} 2 & 1 & 0 \\ 0 & -2 & -4 \\ -1 & 3 & 8 \end{pmatrix}$$

Note, I have surrounded my matrices with parentheses. You may use square brackets, as in the videos, or parentheses as I've used here. Feel free to use either. Simply be consistent with what you use. You may switch between documents but within your final paper or a single set of questions, only use parentheses or square brackets.

Possible because both of them are 3x3 matrixes.

$$\begin{pmatrix} 1 & 1 & 3 \\ 2 & -6 & -3 \\ 2 & 7 & 6 \end{pmatrix}$$

4. Find the following product, if possible, and if it isn't possible, explain why:

$$\begin{pmatrix} -1 & 0 & 3 \\ 2 & -4 & 1 \\ 3 & 4 & -2 \end{pmatrix} \begin{pmatrix} 2 & 1 & 0 \\ 0 & -2 & -4 \\ -1 & 3 & 8 \end{pmatrix}$$

Note, I have omitted the  $\times$  symbol between the matrices to indicate multiplication. This was done toward the end of the video on matrix arithmetic during the discussion of matrices and encryption. Generally, the  $\times$  symbol is omitted but, if you feel it is needed for clarity, it can be used.

Possible because the number of rows of the first matrix equals the number of columns of the second matrix. Both of them are three.

$$\begin{pmatrix} -5 & -8 & 24 \\ 3 & 13 & 24 \\ 8 & -11 & -32 \end{pmatrix}$$

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We will be using linear systems throughout the course. In our first session, we will see examples of finding a sum and a product of matrices in the context of computer graphics. Such computations are very fast on computers, which is important when visualizing digital images.