**LINEAR ALGEBRA**

Experiment No. # 9

**MATRIX ALGEBRA**

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Score

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CRITERIA** | **Exceeds Expectations** | **Meets Expectations** | **Needs Improvement** | **Unsatisfactory** |
| Functionality  (60 points) |  |  |  |  |
| Completeness  (20 points) |  |  |  |  |
| Structure  (20 points) |  |  |  |  |

**Remarks:**

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*Submitted to*

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Professor

*Date Performed:*

**09-10-2023**

*Date Submitted*

**9-10-2023**

**Objective**

1. Be familiar with the fundamental matrix operations.
2. Apply the operations to solve intermediate equations.
3. Apply matrix algebra in engineering solutions.

**Algorithm**

1. Type the main title of this activity as "Matrix Algebra”
2. On your GitHub, create a repository name Linear Algebra 58013
3. On your Colab, name your activity as Python Exercise 9.ipynb and save a copy to your GitHub repository

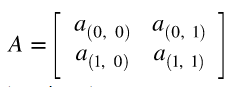
**Discussion**

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| import numpy as np  import matplotlib.pyplot as plt  %matplotlib inline |

*Determinant*

A determinant is a scalar value derived from a square matrix. The determinant is a fundamental and important value used in matrix algebra. Although it will not be evident in this laboratory on how it can be used practically, but it will be reatly used in future lessons.

The determinant of some matrix A is denoted as det(A) or |A|. So let's say A is represented as:



We can compute for the determinant as:



But you might wonder how about square matrices beyond the shape $(2,2)$? We can approach this problem by using several methods such as co-factor expansion and the minors method. This can be taught in the lecture of the laboratory but we can achieve the strenuous computation of high-dimensional matrices programmatically using Python. We can achieve this by using np.linalg.det().

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| A = np.array([  [1,4],  [0,3]  ])  np.linalg.det(A) |

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| --- |
| ## Now other mathematics classes would require you to solve this by hand,  ## and that is great for practicing your memorization and coordination skills  ## but in this class we aim for simplicity and speed so we'll use programming  ## but it's completely fine if you want to try to solve this one by hand.  B = np.array([  [1,3,5,6],  [0,3,1,3],  [3,1,8,2],  [5,2,6,8]  ])  np.linalg.det(B) |

**Coding Activity 9**

Prove and implement the remaining 6 matrix multiplication properties. You may create your own matrices in which their shapes should not be lower than (3,3). In your methodology, create individual flowcharts for each property and discuss the property you would then present your proofs or validity of your implementation in the results section by comparing your result to present functions from NumPy.

**Methods**

Refer to this link for the method: <https://github.com/martlegaspi/58013-Linear-Algebra/blob/01a8d35fd2956c82ddf0f568e1c17dc0c0538768/Laboratory_No9.ipynb>

**References**

<https://www.khanacademy.org/math/precalculus/x9e81a4f98389efdf:matrices/x9e81a4f98389efdf:properties-of-matrix-multiplication/a/properties-of-matrix-multiplication>